Salton Sea Management Program
Phase I: 10-Year Plan

Draft Work Plan for Committee Review
September 26, 2017

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Acronyms and Abbreviations

BACM	Best Available Control Method
BACT	Best Available Control Technologies
Basin	Salton Sea Air Basin
CAA	Federal Clean Air Act
CAAA	Clean Air Act Amendments
CARB	California Air Resources Board
CCAA	California Clean Air Act
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CVSC	Coachella Valley Stormwater Channel
DCM	Dust Control Measure
EPA	United States Environmental Protection Agency
IBWC	International Boundary and Water Commission
ICAPCD	Imperial County Air Pollution Control District
IID	Imperial Irrigation District
JPA	Joint Powers Authority
MMRP	Mitigation, Monitoring and Reporting Program
NAAQS	National Ambient Air Quality Standards
NOx	nitrogen oxides
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
QSA	Quantification Settlement Agreement
SALSA2	Salton Sea Hydrologic Model
SCAQMD	South Coast Air Quality Management District
SIP	EPA-Approved State Implementation Plan
SO_2	sulfur dioxide
SSMP	Salton Sea Management Program
USGS	United States Geological Survey
USGS	United States Geological Survey
VOCs	volatile organic carbons

SECTION I: GOALS AND OBJECTIVES

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Chapter 1. Introduction

The Salton Sea Management Program (SSMP) has developed a 10-year plan for Phase I that envisions a range of activities for habitat creation and dust management as the Salton Sea recedes over 2018-2028. The California State Water Resources Control Board (SWRCB), through Draft Stipulated Order Revising WRO 2002-0013, outlines annual and cumulative target areas for restoration through creation of habitat and dust suppression projects. These targets are defined for each year, ranging from a cumulative 500 acres by January 1, 2019 to a cumulative 29,800 acres by January 1, 2029, with a minimum 50% of the area being designated for fish and wildlife habitat projects.[1] The target acreages by year are shown in Figure 1. Specific areas around the Sea are proposed for restoration projects, specifically at the southern end of the sea near the inflows of the Alamo and New Rivers and the northern end of the sea near the inflow of the Whitewater River. See Figure 2 for a map of the Salton Sea watershed, and the five areas identified for future project development.

This Work Plan identifies specific tools that need to be developed and tasks that need to be performed to support the design and implementation of SSMP Phase I actions This includes a set of overarching analyses focused on hydrology, water quality, air quality management, and activities to develop specific projects around the Sea that will create new habitat and help in managing dust emissions. This Work Plan also includes the feasibility evaluation of other longer term projects that may be contemplated in future phases of the SSMP.

Planned restoration in the Salton Sea is advised by a set of committees, representing a range of stakeholder interests and focused on different aspects of restoration as identified below (proposed committee structure, June 2017):

- **Science Committee**: Charged with providing scientific expertise and guidance on SSMP projects and efforts. The State or other committees will refer topics to the Science Committee. Topics will include hydrology, biology, air quality, monitoring and adaptive management.
- **10-Year Plan Committee**: Charged with consultation on advance implementation of the 10-Year Plan by providing input and making recommendations to resolve issues and concerns. Topics will include habitat, air quality, hydrology, and environmental compliance with participation of the former the members of the Project, Environment, and Finance Committees.
- **Air Quality Committee**: Charged with providing guidance on air quality regulatory compliance and coordinate with Air Boards. The Committee will have

[1] http://www.waterboards.ca.gov/waterrights/water_issues/programs/salton_sea/docs/stip_order_draft.pdf

a shared purpose with the Science Committee on reviewing research issues and integrating regulatory issues going to the 10-Year Plan Committee and/or State. Topics will include air quality compliance, dust control, air monitoring.

- **Long Range Committee**: Charged with considering alternative long-range solutions (twice yearly) and recommend those that should advance to scientific review. Committee to provide input on the Long Range Plan and identify funding to support its implementation. Topics will include long term solutions to issues at the Sea that extend beyond the 10-Year Plan.
- **Outreach Committee**: Charged with providing advice on local community outreach to inform and solicit input on health, air quality, and social aspects of implementation of the SSMP. The mission of the Outreach Committee is to assist the state in communicating clear and consistent mutual understanding of the Salton Sea Management Plan for communities and stakeholders concerned across the Salton Sea. Topics include Community Outreach Plan and public meeting planning.

It is expected that this draft Work Plan will be reviewed by the committees and updated following any feedback received. Going forward, it will serve as a guide for additional work to be performed by the State as part of the SSMP Phase I, although modifications will continue to be made as new experience is gained on project implementation and new data are collected from completed projects.

In the remainder of this document each of the task areas are discussed. This includes a group of tasks identified as *Section II Overarching Project Development and Management Needs* that apply to the entire SSMP: the estimation of water availability for projects in the different Phase I areas (Chapter 2); the water quality targets for these projects (Chapter 3), the development of a habitat planning and design tool to systematically evaluate individual project components for future implementation(Chapter 4), air quality management needs (Chapter 5), environmental compliance needs (Chapter 6), and compatibility with other regional planning efforts (Chapter 7). This section also includes a chapter on additional projects, beyond those identified in Phase I, in support of a smaller but sustainable Sea (Chapter 8). The Work Plan also includes a set of tasks in *Section III Action Plan* for Phase I Areas for preliminary conceptualization and costing of projects in the five areas shown in Figure 1. These include planning and design for the New River West and East areas (Chapter 8), the Alamo River North and South areas (Chapter 9), and the Whitewater River area (Chapter 10). This Work plan concludes with a summary and proposed schedule (Chapter 11).

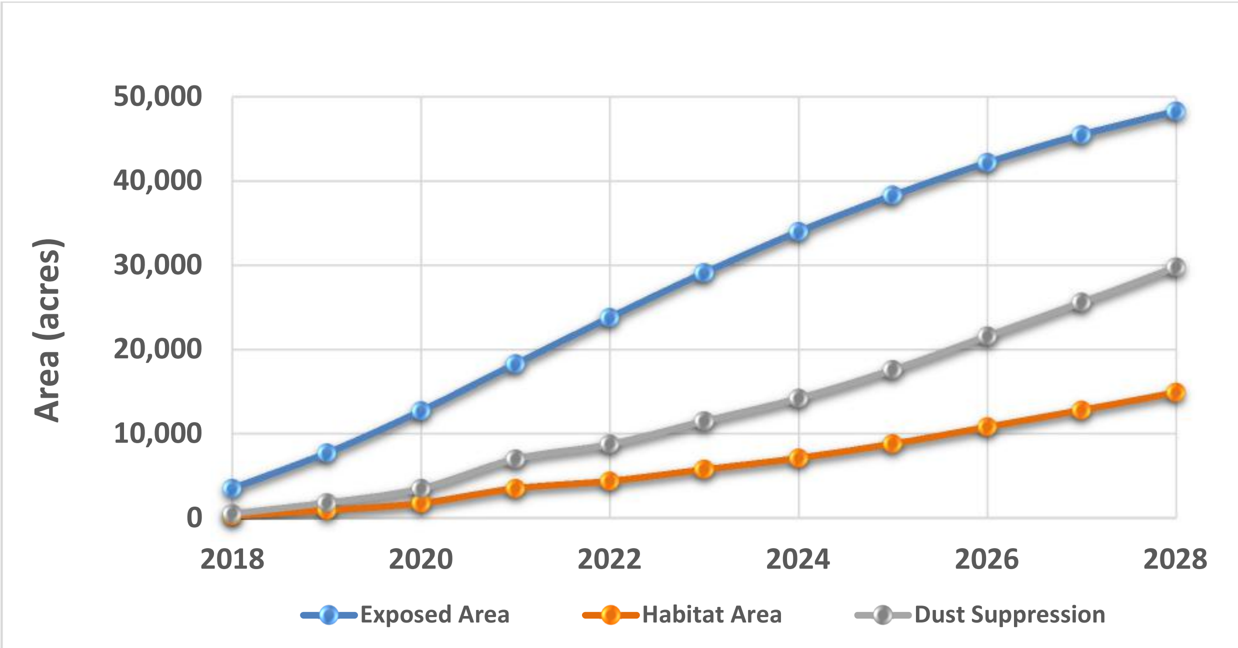

Figure 1 Estimates of exposed area around the Salton Sea based on modeled future inflows, with proposed targets for wet habitat creation and other dust suppression projects in the State Water Board Draft Stipulated Order.

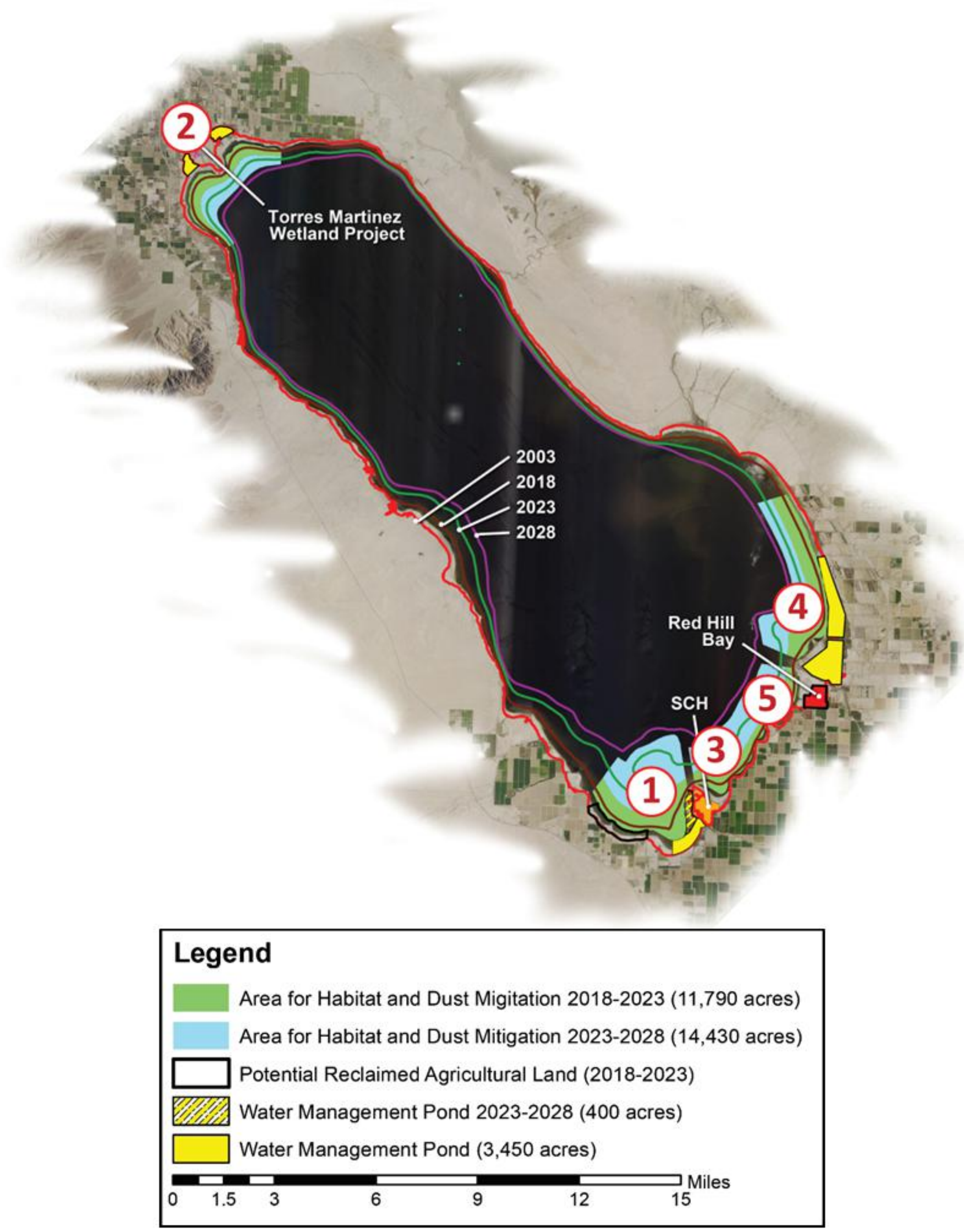

Figure 2 Outline of Salton Sea, with changing shoreline over time from 2003-2028. Also shown are the five areas identified for Phase I implementation (1 = New River West; 2 = Whitewater River; 3 = New River East; 4 = Alamo River North; 5 = Alamo River South).

SECTION II: OVERARCHING PROJECT DEVELOPMENT AND MANAGEMENT NEEDS

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Chapter 2. Hydrology for Project Implementation

Overview

Prior to investing in water-dependent habitat projects it is important for the State to quantify the sources of water at different locations, and understand the quantity and reliability of these sources over future decades. The primary source of Salton Sea water is agricultural return flow, and its supply is subject to change if there are changes in irrigation strategies and land use or if there is greater implementation of water recycling efforts in the basin. An understanding of the water availability for specific projects around the Sea therefore needs to include anticipated changes in the water supply originating in the Colorado Basin and changes in water use in the watershed that contribute drainage flows to the Sea.

Goals and Objectives

A key target of this work is to estimate the water demand of the proposed Phase I projects, and the available supply, both monthly and annually, for the entire Salton Sea, *and* at the different Phase I project locations, over a specified time frame that corresponds to the lifetime of the projects (e.g., 30-50 years). This includes developing potential hydrologic scenarios to support adequate flexibility in the corresponding design of individual project facilities. The scenarios will consider projected trends in flows over the design life as a consequence of changes in land use, farming practices, and climate change.

Prior Work

Figure 2 shows a simplified hydrologic cycle for the Sea, including the relative magnitudes of the sources. Water from the Colorado River is diverted into the Imperial and Coachella Valleys for irrigation, and the resulting drain waters flows into the Salton Sea through the Alamo River, New River and Whitewater River (via the Coachella Canal into the Coachella Valley Stormwater Channel or CVSC). Precipitation and groundwater also feed the Sea directly.

Stream flow observations provide insight into the changes in the hydrology of Salton Sea basin. Recent changes have included reductions in flows from Mexico. In the future, with the full implementation of the Quantification Settlement Agreement, stream flows to the Salton Sea are expected to decrease further. Sources of data included state and federal government agencies, specifically the California Environmental Data Exchange Network (CEDEN), the United States Geological Survey (USGS; http://waterdata.usgs.gov/nwis), Reclamation's Salton Sea division, the Imperial Irrigation District (IID), and the International Boundary and Water Commission (IBWC; http://www.ibwc.state.gov/wad/histflo3.htm). Data were compiled for key locations in each river basin. These locations included multiple sites on each of the rivers, major and minor agricultural drains, and the Salton Sea itself. USGS gage locations for major inflows and elevations are shown in Figure 4.

Historical flow data from the Alamo, New and Whitewater River Basins, focusing on the last two decades, are summarized to provide a general understanding of the seasonal flow contributions in the basin, and to provide a baseline for future work. Average monthly flows from the Alamo River over two time periods, 1980-2002 and 2003-2013, are presented in Figure 5. The Alamo River reaches its highest flows during the months of March to May during peak irrigation. Recent monthly flows have not increased or decreased significantly compared with historical values. Average monthly flows from the New River over the same two periods are presented in Figure 6. The New River reaches its highest flow during the month of April during peak irrigation. Flows have decreased fairly consistently over the annual hydrograph but the largest reduction in flows compared with historical values occurs during August. Average monthly flows from the Whitewater River/ CVSC are presented in Figure 7. The Whitewater River/CVSC has shown a decline in flow and the hydrograph has levelled off considerably in the most recent period (Figure 7). The flow reaches its highest point in February, likely as a result of stormwater flows, and due to a smaller agricultural drain input compared with the New and Alamo Rivers.

Daily surface elevation data for the Salton Sea station near Westmorland, CA have been summarized for 1987 to 2015. During this period of record, the average daily surface water elevation has decreased by 5.5 ft. (Figure 8). The elevation peaked in 1995 but declined at an accelerated rate thereafter. A precipitous drop in water level occurred in 2014, bringing the Sea level down to -234 feet below the National Geodetic Vertical Datum of 1929 (NGVD 29). The NGVD 29 convention is retained in this document, because daily elevation data that continue to be reported by USGS correspond to this datum (https://waterdata.usgs.gov/ca/nwis/uv?site_no=10254005).

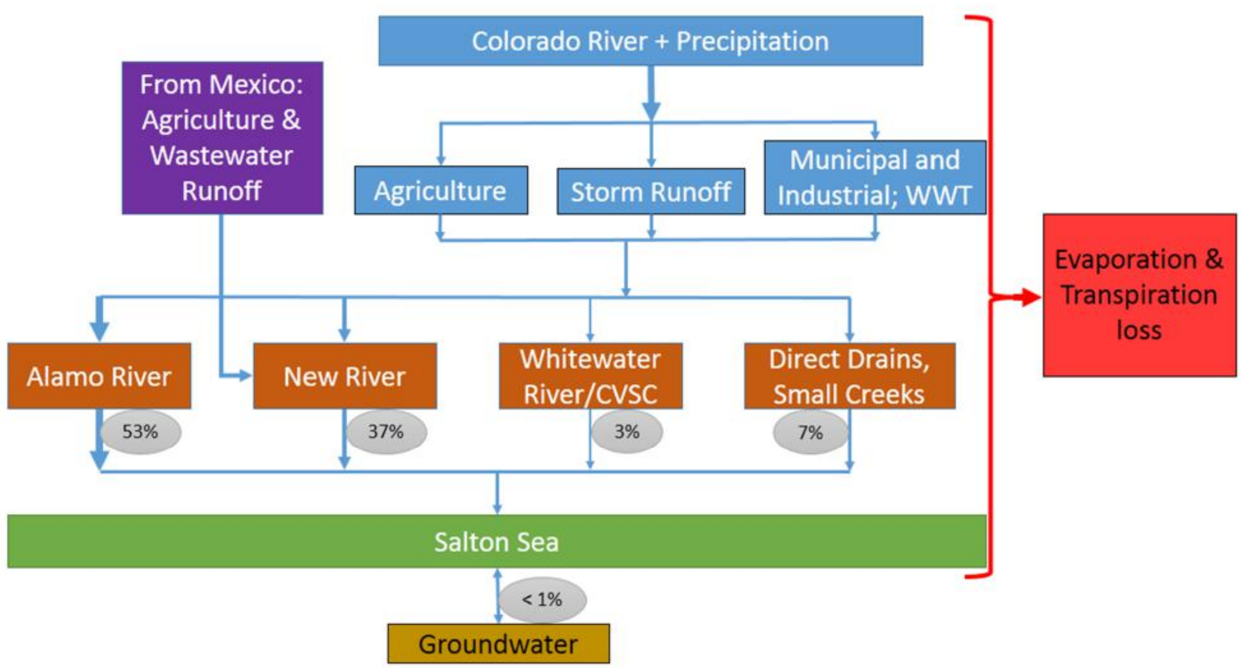

Figure 3 Salton Sea schematic flow diagram.. Grey circles show the relative percent contribution of the total inflow from each source to the Sea in 2013. WWT = wastewater treatment.

Figure 4 USGS inflow and elevation sampling locations for the Salton Sea.

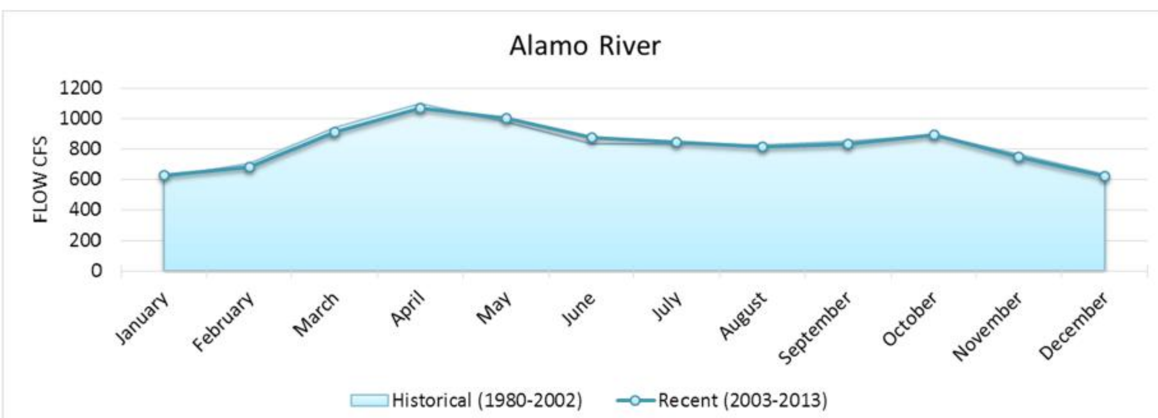

Figure 5 Alamo River discharge in cubic feet per second (CFS) by month and averaged over 2003-2013 and a historic period of record (1980-2002).

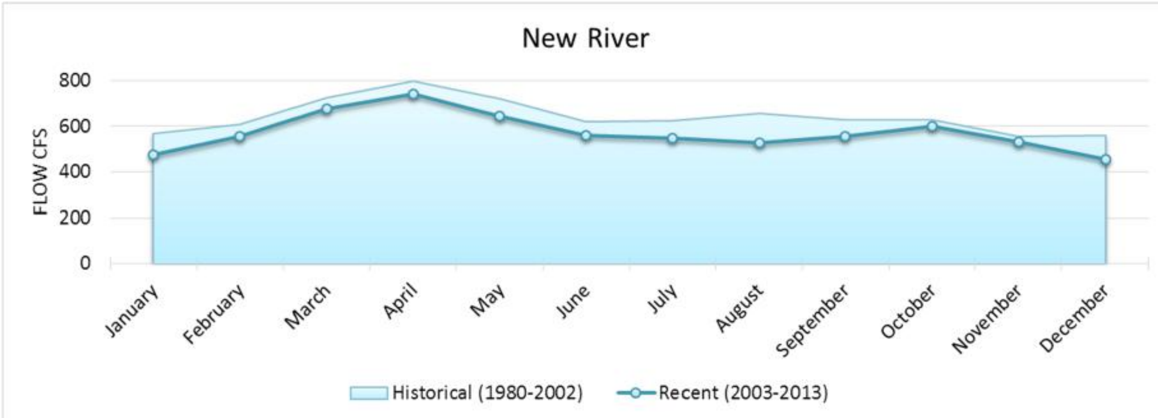

Figure 6 New River discharge in cubic feet per second (CFS) by month and averaged over 2003-2013 and a historic period of record (1980-2002).

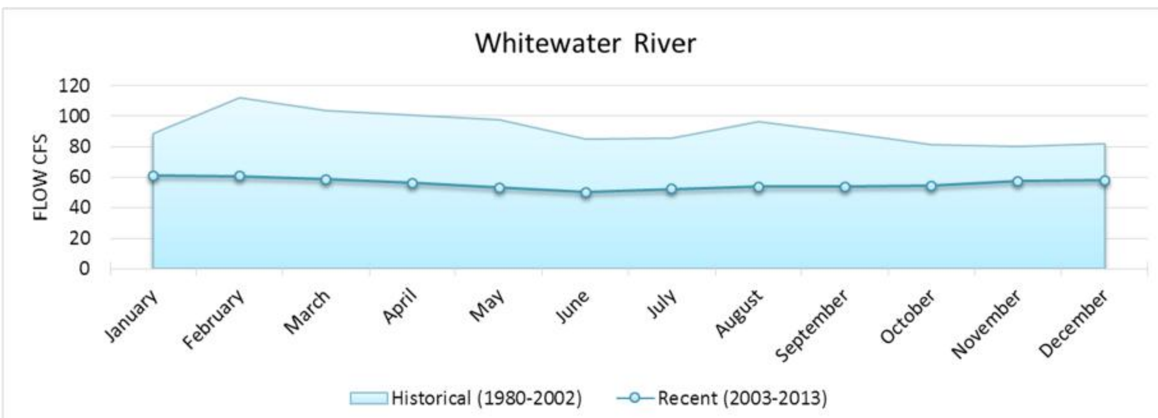

Figure 7 Whitewater River/CVSV discharge in cubic feet per second (CFS) by month and averaged over 2003-2013 and a historic period of record (1980-2002).

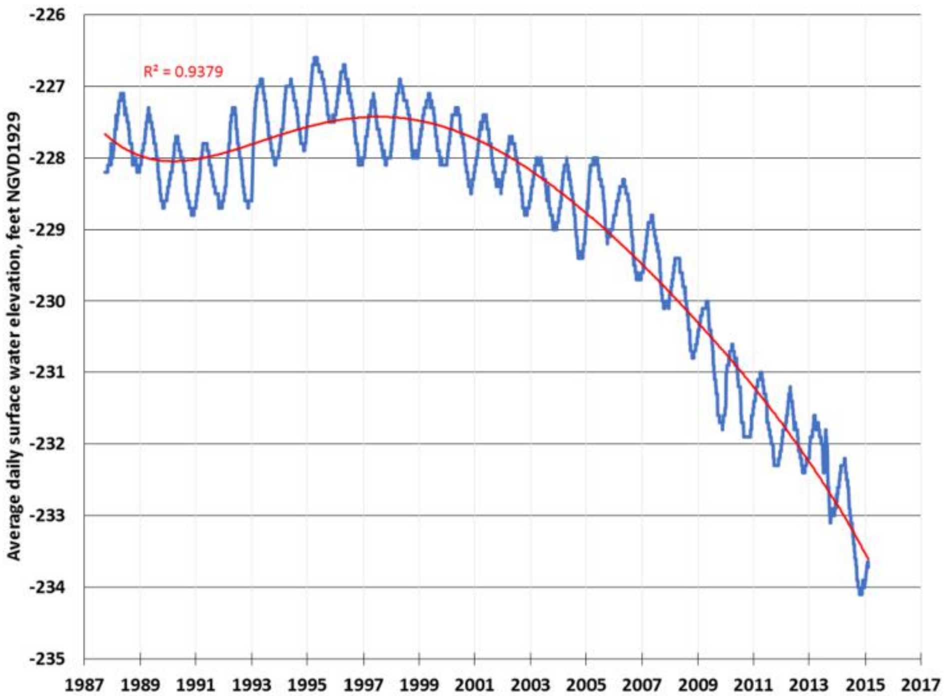

Figure 8 Daily surface water elevation above NGVD 29 for Station 10254005 located along Salton Sea near Westmorland, CA from October 1987 to February 28, 2015 (USGS). Trend line (5th order polynomial) with R^2 shown in red.

Approach

Salton Sea hydrology and water budgeting analysis is being developed independent of this Work Plan. DWR is in the process of updating the hydrology dataset and preparing for water budgets and demand projections for Salton Sea system and for each of the restoration areas. An important element of this effort is developing a complete assembly of water budget components that link between databases and legal/contract requirements/constraints to estimate total inflows into the Sea from all sources by a water allocation model of the system. The inflows determine the surface elevation of the Sea and salinity over time and thus the exposed areas over which restoration projects are to be constructed. Accurate Sea level projections are needed to sequence the development of new habitat and dust management measures in different areas. Sea level projections are proposed to be based on the Salton Sea Analysis model (2014 version), or SALSA2 model, developed through Imperial Irrigation District (IID) support, which calculated Sea elevation and salinity for inflows with or without QSA implementation. DWR, in collaboration with IID and the federal government, are updating data and assumptions that are inputs to the model.

An additional focus is the analysis of water demand for each of the five projects identified in Chapter 1. Water from the New River, Alamo River, or Whitewater River will be diverted into the water management ponds and blended with saline water diverted from the Salton Sea to maintain designed water depths and salinity levels in the ponds between 20 – 40 parts per thousand (ppt). The management ponds will provide areas of deep water habitat for fish and piscivorous birds, as well as supply water to areas down playa for habitat and dust mitigation. The water demand will be estimated and the reliability of river water supply will be examined.

Outcomes and Deliverables

A technical memorandum of the water demand and supply study for the five identified projects has been released by DWR on September 14, 2017. Revisions are anticipated as project concepts are developed and the Salton Sea system hydrology is updated.

The next step is to revise the Salton Sea system hydrology. The database of the historic surface and groundwater supply and demand in the Salton Sea system will be developed. The constraints on water supply accounting for contracts, water rights, and agreements will be summarized. Future projections of inflows to the Salton Sea will be developed to reflect the change of land use, population, farming practices, and climate change. A water allocation model will be developed to assemble all the components as a tool to produce Salton Sea inflows based on various hydrologic conditions, environmental requirements, and interagency agreements.

Sea elevation, salinity, and exposed playa acreage projections will be updated after the system hydrology is revised. The project water demand and supply reliability analysis will then be updated accordingly.

Chapter 3. Water Quality for New Habitat Creation

Overview

The quality of water to be used for creating habitat—in terms of salinity, nutrients, and trace elements such as selenium—needs to meet certain targets to minimize risks to wildlife and humans, and to create suitable habitat. These targets need to be met at the present time, and over the lifetime of the projects, when it is possible that the quality of inflows may change. This work will characterize the quality of water supplies in different sources over time to support the development of suitable water quality in habitats that are planned.

Goals and relationship to SSMP

All habitat created through the SSMP will need water of adequate quality in the inflows and within the habitat; however, water sources that are used directly for air quality management may have less restrictive requirements. From previous work, a primary concern for wildlife in the water sources in the Salton Sea basin is selenium, and levels in the habitats have to be managed to minimize bioaccumulation and ecological risks. Similarly, nutrients in the water supplies may lead to excessive biological growth in the newly created habitats and potentially lead to reduced dissolved oxygen, and adverse effects on aquatic biota. Some water quality constituents, primarily salinity and temperature, have target levels to sustain a desirable range of prey species for the wildlife occupying the habitat, and must be managed through the design and operations of newly created habitat. The goal of this work is to establish the appropriate water quality in inflows associated with Phase I projects, and the water quality targets and design considerations for individual SSMP components.

Prior Work

Baseline Data

Water quality in the Salton Sea is regulated by the Colorado River Basin Regional Water Quality Control Board (Regional Board 7 in California), with the eventual goal of supporting the different beneficial uses of the rivers and the Salton Sea. Regular characterization of water quality in the Sea has been performed through monitoring programs operated by the State, the US Bureau of Reclamation, the USGS, IID and Coachella Valley Water District (CVWD). A brief summary of recent patterns in salinity, nutrients, and selenium is provided as a baseline for future analysis.

Based on CEDEN data within the Salton Sea, salinity, expressed as total dissolved solids (TDS) or as milliSiemens/cm (electrical conductivity), has increased continuously over the last decade (Figure 9 and Figure 10). The ions mostly responsible for the salinity increase are chloride, magnesium, sulfate and sodium. Some have reported that the Sea has become oversaturated with regard to calcite and gypsum, leading a considerable percentage (estimated up to 1/3) of the salt load to precipitate out of solution (Amrhein et al. 2001). Salinity in the New River and the Alamo River, and the drains discharging to them is about a tenth of the salinity in the Sea (Figure 11 through Figure 14). Whitewater River salinity levels are lower than in the New and Alamo Rivers

(Figure 15). Salinities in the inflows do not appear to show a systematic trend over time.

In addition to salinity concerns, water quality in the Salton Sea basin is affected by a variety of sources in the inflows. Pollutants associated with impairment are identified through the 303(d) list (governed by the Federal Clean Water Act). The sources of most concern are various chemicals related to the agricultural activities in the watershed and selenium (Se), which originates in the source waters from the Colorado River, but is concentrated to higher levels resulting from agricultural practices in the Salton Sea watershed. Typically, total maximum daily load (TMDL) analyses are performed to develop approaches to reduce the pollutant levels, although non-TMDL actions are also possible. At this time, the most recent 303(d) list is for 2010, and includes the water body and pollutants, and some have TMDLs completed (Table 1; CRBRWQCB 2010). Looking forward, it is important to recognize that management of existing levels of contamination in the Sea as well as in the watershed may need to be addressed through non-point source control in addition to activities focused on restoration actions. First, this is because some environmental concerns in the Sea occur in the watershed. For example, nutrients in the inflows result in eutrophic conditions that lead to the listing for low dissolved oxygen. Second, the primary river waters are listed for toxicity of Se, and their use for restoration purposes must ameliorate potential ecological risks.

The California Toxics Rule (CTR) (May 2000) provides the appropriate standards for total Se when the Basin Plan does not provide one. The CTR provides a long-term, or chronic, exposure standard of 5.0 micrograms per liter (µg/L) for the protection of aquatic life in freshwater. More recently, US Environmental Protection Agency water quality guidelines have been finalized for freshwater systems (USEPA, 2016): 1.5 µg/l for lakes (lentic systems) and 3.1 µg/l for rivers (lotic systems) as 30-day averages. Slightly higher concentrations are allowable for shorter durations, but this will apply only where there is a high frequency of measurement (details in USEPA, 2016). Lentic targets for freshwater may not apply to the saline waters of the Salton Sea. In addition, fish tissue concentrations are also to be monitored because of Se uptake via the food chain (USEPA 2016). Targets include concentrations of 15.1 mg/kg in ovary/egg tissue, 11.3 mg/kg in muscle tissue, and 8.5 mg/kg in whole-body fish tissue. In sediments, a Se concentration of greater than 4.0 µg/g is a suggested toxicity threshold, and concentrations from 1 to 4 µg/g are considered elevated above background concentrations (Hamilton 2004).

Table 1 presents recent baseline data for selenium (Se), because of a long-standing concern of bioaccumulation in biota for this element. Dissolved Se measured at the Salton Sea ranged from 0.3 to 4.3 µg/L between 2002 and 2014 (Figure 16). Two large spikes of dissolved Se were observed in 2005-2007, coinciding with observed nutrient concentrations spikes. Average Se was about 1.2 µg/L over the past 12 years at the Salton Sea. Total Se measured in sediment samples ranged from 1.5-11.8 µg/g and averaged 5.37 µg/g between 2005 and 2014 (Figure 17). Se levels in the Sea water column are considered below the level of concern for aquatic life within the Sea but sediment concentrations are a concern for toxicity (DWR and CDFW 2013). Higher concentrations of dissolved Se were found in the source rivers (averaging 6 and 6.8

µg/L at the outlets of the New and Alamo Rivers, respectively) (Figure 18 and Figure 19), indicating Se partitions to sediment and is stable under anaerobic conditions but can be mobilized in alkaline, well-oxidized waters (Setmire and Schroeder 1998, DWR and CDFW 2013). Concentrations in Whitewater River were less than half the level in New and Alamo Rivers (2.6 mg/l, Figure 20). New and Alamo River concentrations are higher than the freshwater lotic targets (USEPA, 2015). Drain Se concentrations (not shown) exhibit a wide range, sometimes higher than the CTR and USEPA (2015) targets, although they also represent a wide range of inflow volumes. The river concentrations integrate the contributions of multiple drains and are a better representation of watershed Se loading to the Sea.

Nutrients are a major source of contamination in the Salton Sea basin, and in all source waters to be considered for the SSMP. In the recent data shown in Figure 21, Salton Sea total phosphorus (P) concentrations were high, typically about 0.1 mg/L after 2007. This is greater than the EPA eutrophic criterion of 0.03 mg/L (U.S. EPA 1980) and the Salton Sea has been characterized as eutrophic and phosphorus-limited (DWR and CDFW 2013; Holdren and Montaño 2002; Setmire et al. 2000; Schroeder et al. 2002). Data also show even higher values in the 2001-2006 period (>0.3 mg/l). The numeric TMDL target for Total P in the Salton Sea is an annual average of 0.035 mg/L; this target has been exceeded every year. However Total P concentrations have declined over the past decade. Total P concentrations were much higher in the Whitewater River than the other sources, and all the Rivers had significantly higher Total P concentrations than the Sea (Figure 22). Within the Salton Sea, Total nitrogen (N) increased from 2002 to 2005 and decreased from 2007 to 2012 (Figure 23). Maximum total N in the Sea was 14.5 mg/L and has decreased to a maximum of 6 mg/L after 2007. Ammonia concentrations ranged from 0.02 mg/L (in February 2011) to 2.9 mg/L (in November 2006) and averaged 0.83 mg/L over the past decade. Total N in the Salton Sea was mostly Total Kjeldahl Nitrogen (TKN; ammonia and organic N) due to periodic reducing conditions and the decay of biomass. Total N has not decreased below concentrations observed in 2002 and remains quite high. Similar to spatial trends seen with Total P, Total N was highest in the Whitewater River, lower in the other Rivers, lowest at the Alamo River Mexico border, and low in the Sea (Figure 24). The majority of nitrogen species within the Sea were typically ammonia due to the reduced conditions, and up to 25% as nitrate + nitrite. The Redfield ratios (Total N: Total P) calculated for the Sea were very high, as reported in Holdren and Montaño (2002) and others. Ratios greater than 7 represent a limitation of phosphorus on algal growth, and this always the case in the Sea (Figure 25).

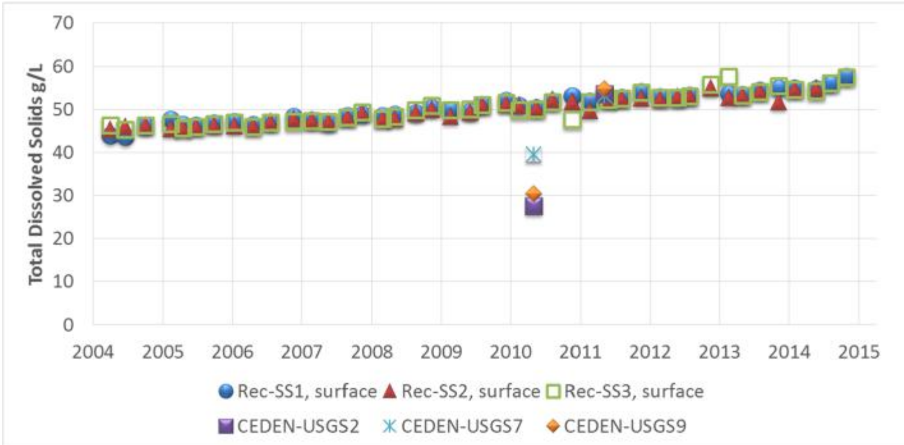

Figure 9 Salinity as total dissolved solids (TDS; g/L or ppt) of Salton Sea Stations. CEDEN data stations and Reclamation (Rec) stations.

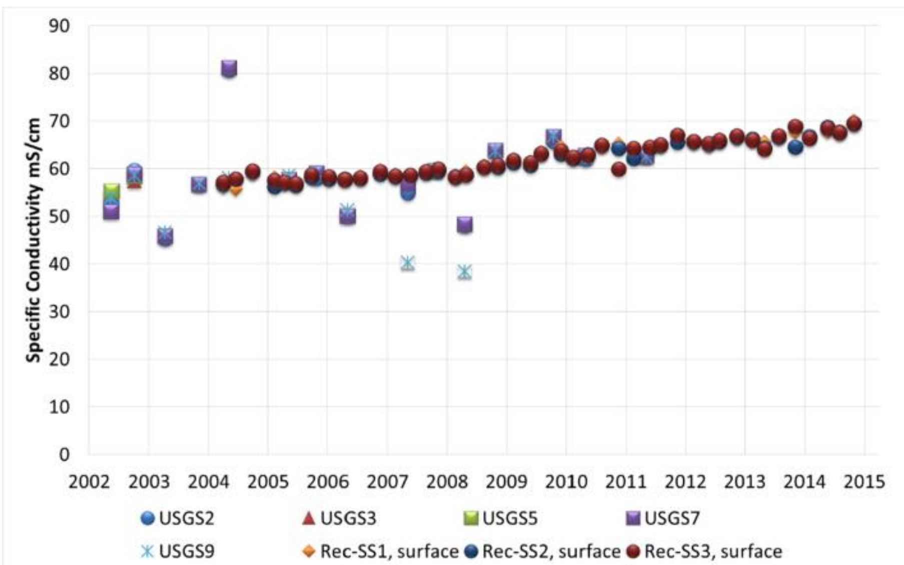

Figure 10 Specific conductivity of Salton Sea Stations (mS/cm @ 25°C). CEDEN (USGS) data stations and Reclamation (Rec) stations.

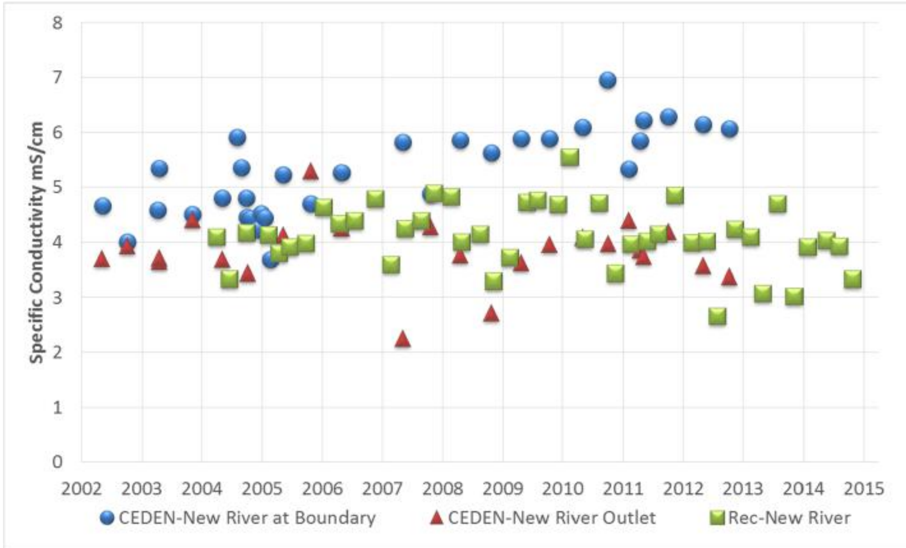

Figure 11 New River at the International Boundary and the Outlet. CEDEN and Reclamation (Rec) data for total specific conductivity (mS/cm @ 25°C).

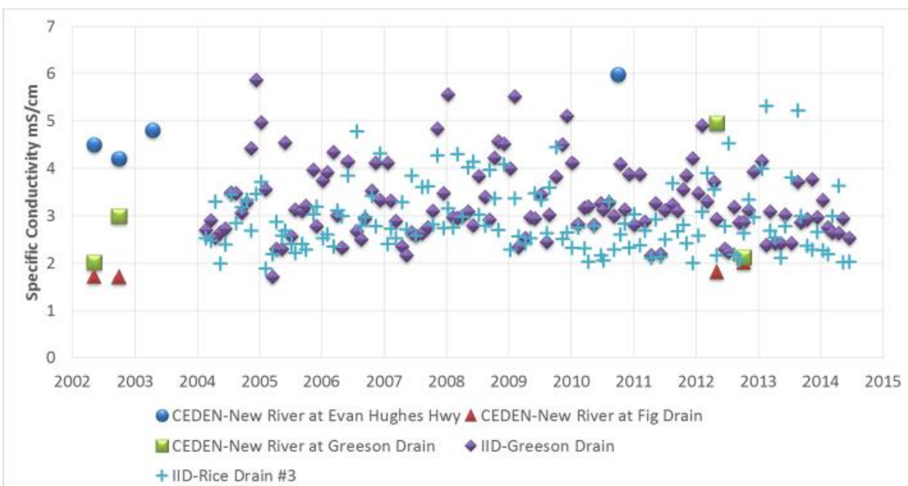

Figure 12 New River agricultural drains. CEDEN and IID data for specific conductivity (mS/cm @ 25°C).

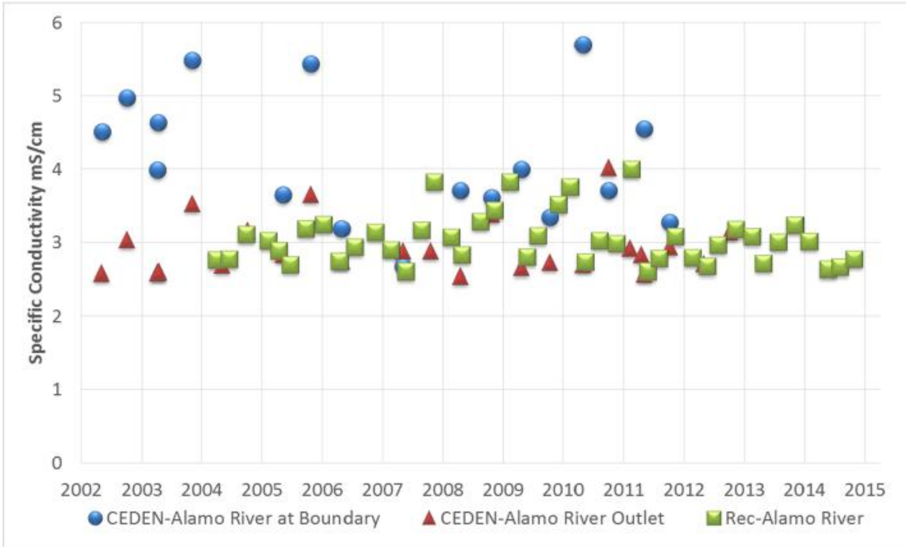

Figure 13 Alamo River at International Boundary and the Outlet. CEDEN and Reclamation (Rec) data for specific conductivity (mS/cm @ 25°C).

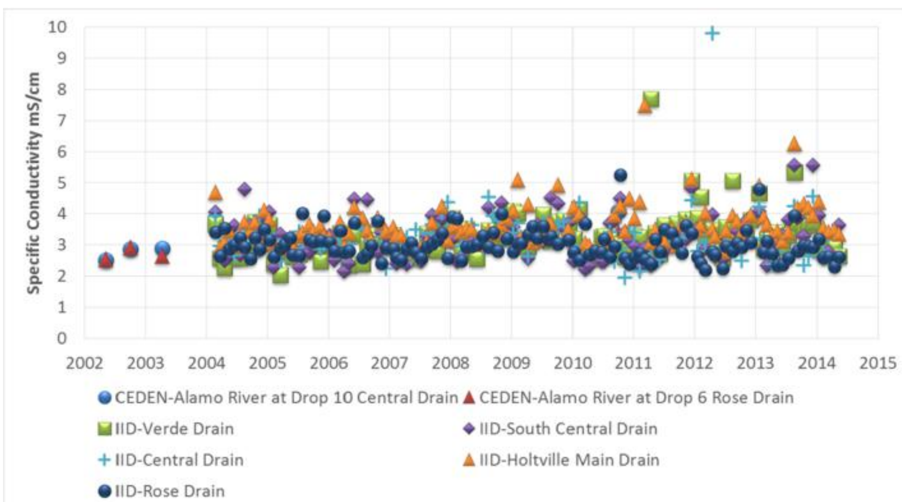

Figure 14 Alamo River agricultural drains. CEDEN and IID data for specific conductivity (mS/cm @ 25°C).

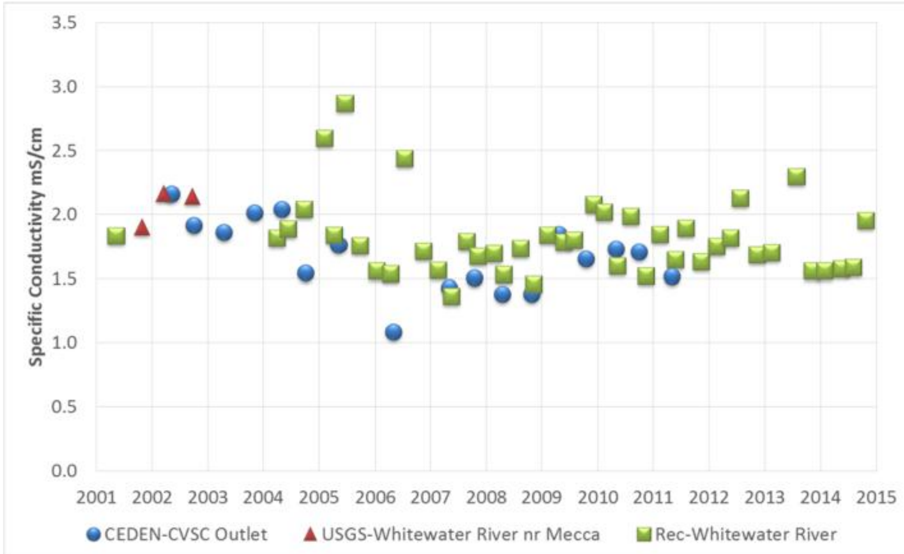

Figure 15 Whitewater River near the outlet to the Salton Sea specific conductivity (mS/cm @ 25°C) data from CEDEN, USGS and Reclamation (Rec).

Table 1
EPA 303(d) list by water body and pollutant/stressor

Water Body	Pollutant/Stressor																						
	Arsenic	Chlordane	Chlorpyrifos	Copper	Dichlorodiphenyltrichloroethane (DDT)	Diazinon	Dieldrin	Endosulfan	Enterococcus	Escherichia coli (E. coli)	Hexachlorobenzene	Mercury	Nutrients	Organic Enrichment/Low Dissolved Oxygen	Polychlorinated biphenyls	Pathogens	Salinity	Sedimentation/Siltation	Selenium	Toxaphene	Toxicity	Trash	Zinc
New River		1	1	1	1	1	1				1	1	1	1	1	2		2	1	1	1	2	1
Alamo River		1	1		1	1	1	1	1	1		1			1			2	1	1			
Imperial Valley Drains		1			1		1	1							1			2	1	1			
Salton Sea	1		1		1				1				1				3		1				
Coachella Valley Stormwater Channel*					1		1								1	2				1			

Notes
1 On 303(d) list (TMDL required or in place)
2 Completed TMDL
3 TMDL development will not be effective in addressing this problem, which will require an engineering solution with Federal, local, and state cooperation (CRBRWQCB 2010)
*Coachella Valley Stormwater Channel is the channelized portion of the Whitewater River from Lincoln Street to the Salton Sea

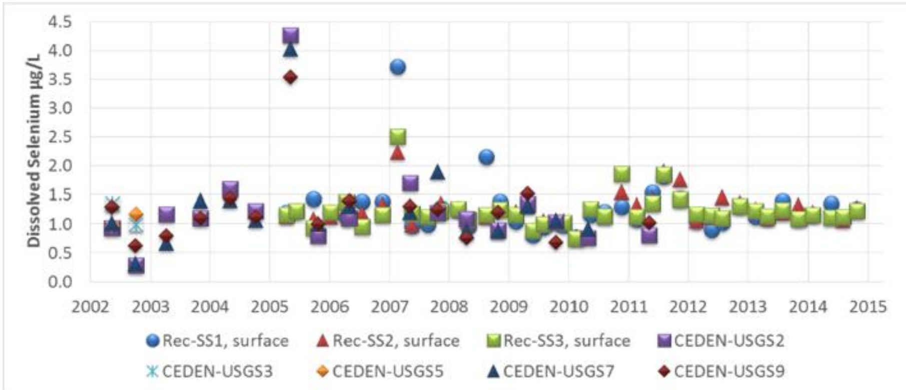

Figure 16 Dissolved selenium in stations located throughout the Salton Sea. CEDEN and Reclamation

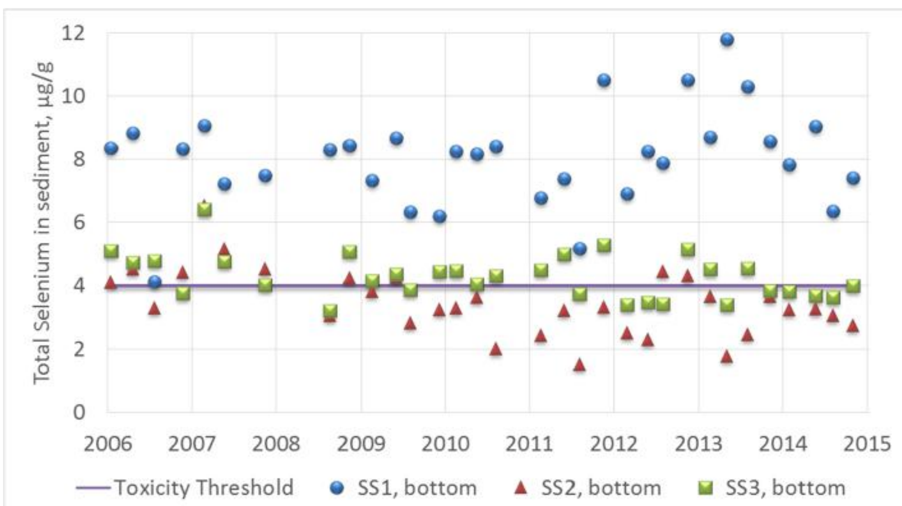

Figure 17 Total Se in sediments at three sampling stations in the Salton Sea, Reclamation data (SS1 is the deeper part of the Sea in the north; SS2 in the middle, and SS3 in the south, Holdren and Montaño, 2002). The gray line is a toxicity threshold of 4 µg/g.

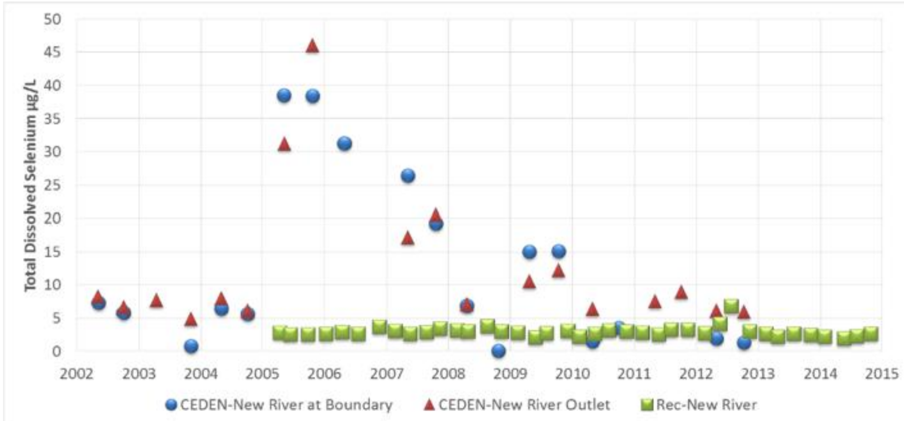

Figure 18 New River at the International Boundary and Outlet. CEDEN and Reclamation (Rec) data for total dissolved Se (µg/L).

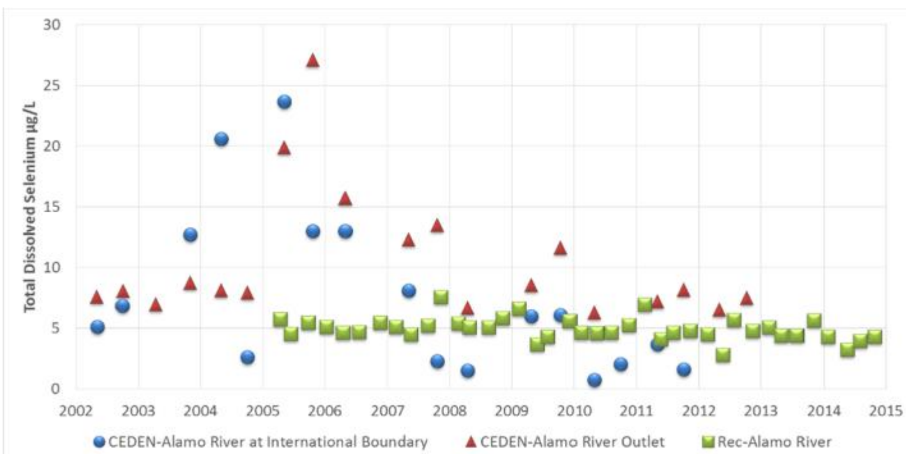

Figure 19 Alamo River at the International Boundary and the Outlet. CEDEN and Reclamation data for total dissolved Se (µg/L).

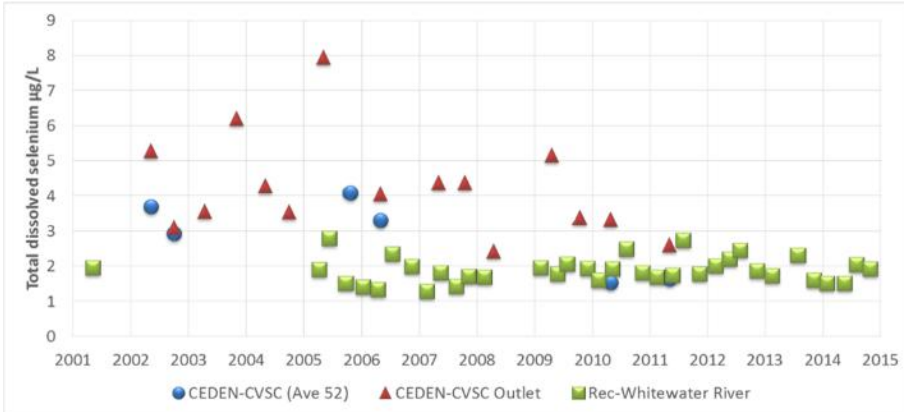

Figure 20 Whitewater River at the Outlet and at Avenue 52. CEDEN and Reclamation (Rec) data for total dissolved Se (µg/L).

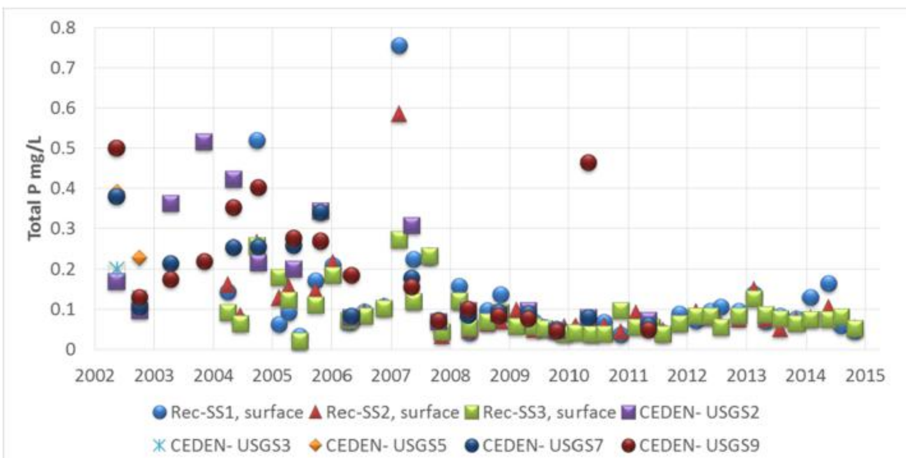

Figure 21 CEDEN and Reclamation data for Total P (mg/L) in the Salton Sea. One data point greater than 1 mg/L has been omitted.

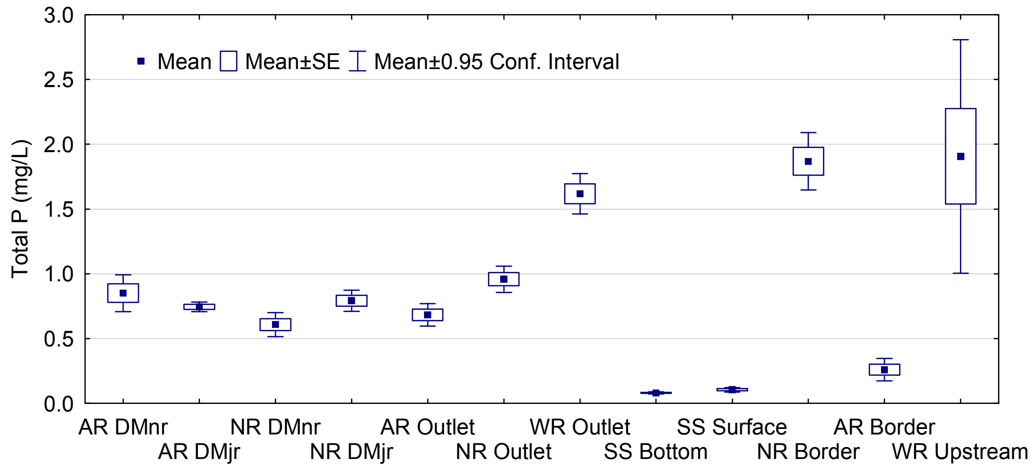

Figure 22 Box plot of Total P data by measurement location from 2002-2014. (AR=Alamo River, NR=New River, WR=Whitewater River, SS=Salton Sea, Upstream=Avenue 52 location, DMjr= Major Drain, DMnr=Minor Drain, Border = Mexico International border, Outlet=outlet to Salton Sea)

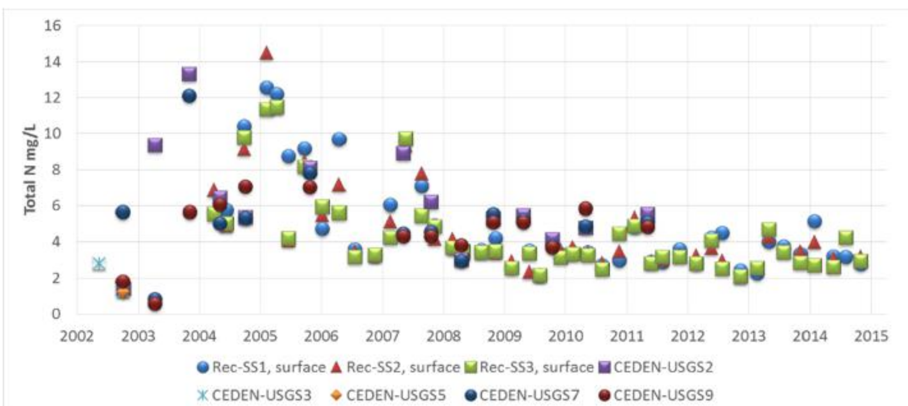

Figure 23 Stations located throughout the Salton Sea. CEDEN and Reclamation data for Total N (mg/L) in the Salton Sea.

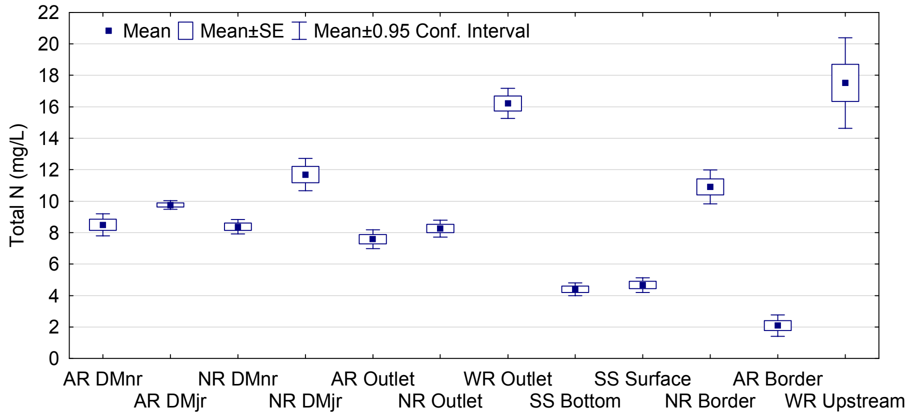

Figure 24 Box plot of total N data by measurement location from 2002-2014.

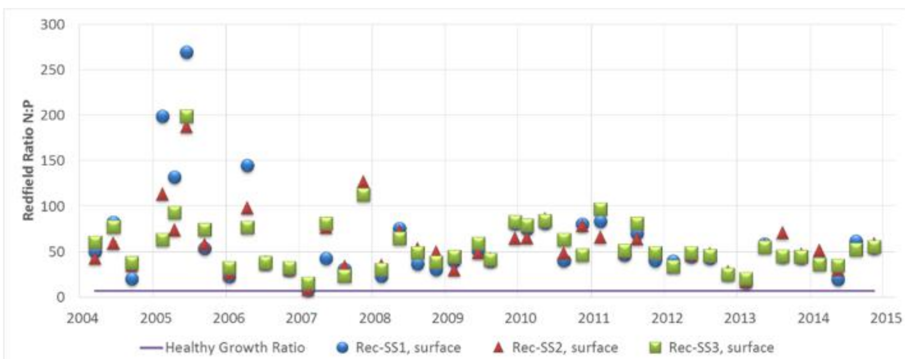

Figure 25 Reclamation data used to calculate N:P ratios at three Salton Sea surface water monitoring locations.

Water Quality Considerations in Newly Created Habitat

The most important water quality concerns identified in the Species Conservation Habitat (SCH) final EIS/EIR are salinity, temperature, dissolved oxygen, nutrients, and Se (also a concern in sediment, bird eggs and other biota). These key indicators will be monitored within the SCH habitat in order to determine the effects of various operational scenarios under an adaptive management framework and to meet regulatory requirements (DWR and CDFW 2013). The water quality science panel created by the Salton Sea PEIR process had previously identified selenium, hydrogen sulfide, water temperature and dissolved oxygen as potential issues for birds and fish and preferred the use of brackish water for habitat creation if possible (DWR and DFG 2007). Brackish water, resulting from a mix of Salton Sea and river/drain waters, may have lower selenium concentrations than freshwater sources. The 2006 Salton Sea Authority plan identified eutrophication and the associated issues including high hydrogen sulfide, ammonia and toxic algae levels and poor clarity (Authority 2006). Reclamation's Preferred Alternative report evaluated alternatives based on relative risks due to selenium (fish-eating birds, invertebrate-eating birds), hydrodynamics/stratification, eutrophication, fishery sustainability and future inflow (Reclamation 2007). Academic studies have focused on similar issues.

Previous reports have produced conclusions regarding water quality and what can be done to mitigate some of the effects. These lessons can be utilized in the context of restoration plans for the Sea, including additional shallow habitat. Most of the issues associated with water quality are not fully understood and targeted monitoring is recommended, however some potential issues can be managed through operational criteria, such as Se.

Key findings from the SCH EIS/EIR include:

<u>Contaminants in water and sediment at proposed sites for SCH Alternatives</u>

Selenium was highest in the Alamo River, followed by the New River, then the Salton Sea. Aerated conditions created by the ponds can produce oxidized selenium, which is more soluble, although the amount dissolved into water will depend on several factors, most particularly the presence of iron (Fe [III]). This suggests an initial “flush” of selenium from the sediments could occur immediately after filling the ponds and is consistent with observations at the Reclamation/USGS Saline Habitat Ponds (Miles *et al.* 2009). However, dissolved selenium in inflow water would likely pose a greater relative risk to wildlife bioaccumulation than selenium released from sediment (Amrhein *et al.* 2011). Researchers also found that the most selenium was released under sediments drained for 2 months, less under sediments drained for 1 month, and the least under currently flooded sediments. The relative risk to wildlife accumulation is lower from selenium released from sediments than from the selenium concentration in the water (DWR and CDFW 2011).

Deeper sediment generally contained higher concentrations of pesticides. Dichlorodiphenyldichloroethylene (DDE) was the predominant residue detected in the Dichlorodiphenyltrichloroethane (DDT) metabolites. A screening criterion of 31.3 ng/g DDE was identified as a Probable Effects Concentration (PEC) for general ecotoxicity (MacDonald *et al.* 2000 and CRBRWQCB 2010) to prevent direct toxicity to the macroinvertebrate population, which serves as a food base for fish and insectivorous birds. The frequency of surface (0-5 cm) sediment samples exceeding this guideline was 18 percent at Alamo River-Morton Bay (32.41 ng/g maximum); 14 percent at Alamo River-Davis Road (34.40 ng/g maximum); and none at New River sites. The frequency of subsurface (5-30 cm below surface) samples exceeding the PEC was 37 percent at Alamo River-Morton Bay (102.60 ng/g maximum); 7 percent at Alamo River-Davis Road (38.26 ng/g maximum); and 10 percent at New River East (41.16 ng/g maximum); 3 percent at New River Middle (33.51 ng/g maximum); and none at New River West (DWR and CDFW 2011). Other pesticides were not at a level of concern or not detected.

<u>Hydrological and water quality modeling of SCH alternative designs and operations</u>

The water quality modeling provided one-dimensional vertical profiles of temperature and DO, hourly over a three-year simulation period. Temperature profiles were very similar across scenarios. Water temperatures would periodically drop below tilapia tolerances (11-13°C [52-55°F]) during December through February. Thermal stratification occurred in ponds with smaller surface area (200 acres), which have less fetch and therefore less wind mixing, than larger pond areas. Deeper ponds (1.5 m mean depth) would experience stratification more frequently than shallower ponds (0.76 m mean depth; DWR and CDFW 2011).

Nutrient concentrations are high in the New and Alamo rivers due to contributions from agricultural runoff. Elevated nutrients would produce eutrophic conditions and algal blooms that could lead to anoxia. Modeling results suggested that ponds would become stratified in summer (May-October). Bottom waters would experience anoxia, particularly during periods of algal blooms in spring (March-May) and fall (October). Depending on the pond scenario, increasing residence time (ranging from 4 weeks to 32 weeks) had no effect or increased somewhat the frequency of anoxia. River source (New or Alamo) for blended water supply had little effect on stratification or anoxia. Phytoplankton was more abundant with Alamo River blended water. Populations of zooplankton performed better with New River blended water and thus slightly reduced phytoplankton (DWR and CDFW 2011).

<u>Salinity and temperature tolerances of fish species considered for SCH ponds</u>

The results of this study had implications for the different fish species survival in new shallow habitat. Stocking different tilapia species or strains (individually or in combination) among the SCH ponds could be employed to increase enhance stability of the fishery resource in the ponds in the face of seasonal and annual fluctuations in water quality parameters. A diverse group tested in a laboratory included the Mozambique hybrid tilapia, the wild-type from the Salton Sea, the New River blue tilapia and the Redbelly tilapia and each had different temperature and salinity responses. The Mozambique hybrid tilapia seemed to be the most resistant species across all treatments. The wild-type from the Salton Sea was most likely to survive the cold, and the aquaculture type is the most likely to survive at high and medium temperatures. The New River blue tilapia had good survival in cold temperatures with lower salinity (20 ppt).

Cold temperatures were modeled within the ponds and occurred as episodic events on the order of hours. This would reduce tilapia populations during December to February in the ponds. Researchers also found that ponds should operate with lower salinities during the winter, when cold temperatures stress fish. Seasonal variation in the pond salinity regime also helps to reduce the percentage of water diverted from the river when less is available (DWR and CDFW 2011).

<u>Ecorisk modeling of potential selenium bioaccumulation</u>

Wetting and drying cycles characteristic of some wetland environments are important factors that contribute to selenium mobilization and potential toxicity. Diffusive flux between water and sediments, in general, is highly influenced by the chemistry of both water and sediment (e.g., oxygen and selenium concentrations) (Byron and Ohlendorf 2007). Selenium is often present in chemically reduced forms when wetlands are submerged and have high organic matter. This condition favors volatilization (Masscheleyn and Patrick 1993, as cited in DWR and DFG 2007). When water levels decline and sediments are exposed, as seen with the exposed playa along the receding shoreline of the Salton Sea, selenium becomes more oxidized and bioavailable. As a result, the initial wetting as the SCH ponds are first filled has the potential to temporarily increase selenium bioavailability in sediments and organic matter (DWR and DFG 2007; Amrhein *et al.* 2011).

In the solubilization experiment (Amrhein *et al.* 2011), oxidation rates and the amount of selenium solubilized were not affected by carbon content, salinity, location, or depth of sample core. The rate of release was controlled by the amount of oxidizable iron present in sediments. If iron was present, the oxidized selenium adsorbed onto the iron and remained in the sediment, and less selenium would dissolve into pond water. Therefore, water-soluble selenium (selenate) concentrations over high-iron sediments would be lower compared to low-iron sediments, and less selenium would be available for uptake into the food web via the algal pathway. This particulate-bound selenium (selenite) could still get into the food web through ingestion by benthic organisms. Nevertheless, the volume of dissolved selenium from inflow water would likely pose a greater relative risk to wildlife bioaccumulation than selenium from sediment (Amrhein *et al.* 2011).

Sickman *et al.* (2011) used the modeling approach by Presser and Luoma (2010) to determine how much selenium would be in biota from SCH ponds under different salinity regimes, and how much river water can be used in the ponds before birds exhibit reduced egg viability (inverse modeling).

Model results suggest that fish and bird eggs in SCH ponds utilizing Alamo River water would have about 50 percent higher selenium concentration compared to SCH ponds utilizing New River water (DWR and CDFW 2011). This is due to higher dissolved selenium levels in the Alamo River water relative to the New River. Risk characterization indices suggest there would be moderate to high risk for reduced egg viability in black-necked stilts in Alamo River SCH ponds and that the risks would be elevated above current risk levels. Second, inverse modeling supports the premise that higher salinity levels would result in lower risk from selenium. Salinity of 35 ppt is recommended to reduce risk of reproductive effects (< 6 µg/g dw). If low to moderate levels of reduced hatching success are deemed acceptable, then salinity levels closer to 20 ppt would be adequate for New River SCH ponds.

<u>Selenium treatment of water supply using wetland vegetation</u>

One approach to reducing selenium risk to wildlife would be treating the river water supplying the SCH ponds to reduce water selenium concentrations. Only river water would need to be treated, since Salton Sea water is less than 2 µg/L. Biological treatment, such as constructed wetlands or algal treatment, appears to have the most applicability, although there is lack of consensus among experts and in the literature (Cardno ENTRIX 2010). In the New River, the constructed Imperial and Brawley Wetlands were designed to reduce nutrients as well as selenium (Johnson *et al.* 2009).

A key uncertainty is whether constructed wetlands could reliably reduce water selenium concentrations to less than 5 μg/L (CRBRWQCB 2006) or even 2 μg/L.

Approach

Existing work, based on the published literature, in the field, and in experimental studies, provides a strong foundation for understanding water quality patterns in the proposed habitat, specifically for salinity, selenium and nutrients. Water depth distributions in the newly constructed habitats will be targeted based on the creation of temperature refugia. A comprehensive mitigation and monitoring program will be implemented following the construction of the first habitats to characterize water quality and potential impacts to different beneficial uses. Because of the concern with selenium bioaccumulation to biota, in addition to water quality, a sampling program to monitor fish, invertebrates, and, potentially, bird eggs will be implemented.

Outcomes and Deliverables

A water quality monitoring program will be developed to expand and complement existing monitoring being performed in the region, with a focus of understanding the water quality impacts of the newly created habitats. Annual water quality reports and supporting analyses will be prepared to evaluate the key parameters and their relevance to habitat quality, and mitigation measures may be proposed if needed. Results from the first set of constructed habitats will be used to improve and enhance future designs as different elements of the SSMP Phase I are implemented.

Chapter 4. Habitat Planning and Design Tool

Overview

Building on the existing tools developed for the Species Conservation Habitat (SCH) Project and the Salton Sea Restoration and Renewable Energy Initiative (Initiative), a concept design evaluation model for assessment of infrastructure, water requirements, and costs of restoration efforts at specific locations at the north and south end of the Sea is proposed to be developed. This model is based on hydrology but includes the engineering characteristics of the constructed habitat. The model summarizes habitat characteristics that result from assumed water storage and release operations and computes construction cost and power requirements from those assumptions.

Goals and relationship to SSMP

The goals of this task are to:

- Develop a user-driven computer model, termed Salton Sea Habitat planning and design tool, that can simulate the construction cost and operations of concept habitat designs, and
- Fully integrate the habitat planning and design tool into the concept design process.

The habitat planning and design tool will provide the means to track the allocation of available water and creation of new habitat that further the goals of the SSMP. The model will include design, engineering, and cost information for a concept habitat, such as:

- Habitat features (water depth range, islands, substrate) based on Audubon analysis (Jones et al., 2016),
- Length of containing berms,
- Water budget and salinity over habitat components and over time
- Water quality considerations (selenium, nutrients, and temperature)
- Water diversion facilities (pumps or gravity),
- Ancillary facilities (boat launch, viewing area),
- Excavation and fill quantities,
- Road type and length,
- Dust mitigation,
- Pipelines/canals, and
- Diversion facilities (dams, spillways).

The above list is extensive, and the final simulated components programed into the habitat planning and design tool will be based on discussion with stakeholders. It is expected that the tool will allow for the assessment of habitat concepts and the tracking of the total habitat developed at the north and south ends of the Sea. The total acreage developed and cost to implement will support the goals of the SSMP by identifying projects that are consistent with the SSMP in both acreage and cost. When used with a combination of different concept designs, the tool can be used to stage projects to match SSMP goals and the available funds. The model will be useful in tracking both near-term projects (0-10 years) and the long-term projects as the Sea recedes and exposes more playa. The north and south end of the Sea along with the estimated location of the edge of the water for 2030 and 2050 is shown in Figure 26 and Figure 27.

Prior Work

The logic developed previously for the SCH and for the Salton Sea Restoration and Renewable Energy Initiative (proposed by IID) will provide the basis of the proposed SSMP Habitat planning and design tool. The previous work is contained within two Excel spreadsheets; the cost spreadsheet and the operations spreadsheet. The cost spreadsheet uses built-in Excel functions in specific spreadsheet cells. The operations spreadsheet uses Visual Basic code to define the operations on a daily time step. Output was copied to spreadsheet cells.

Approach

A spreadsheet-based model that uses Visual Basic is proposed to perform the necessary operations and develop the associated costs. The spreadsheet will be driven by the assumed hydrologic and climatic data, and user-defined criteria for operations of the habitat water supply. The model will simulate a specific water-based habitat feature for the simulation period. Previous work was not structured for simulating multiple linked habitat features. At project initiation, DWR will make an assessment of whether the habitat planning and design tool should be expanded to simulate multiple features.

There are two approaches for simulating selected conditions in the Salton Sea (elevation, salinity, area). The first is with projected time series data for assumed future Sea conditions from a model such as SALSA2. The second method is to include a Salton Sea module that in the habitat planning and design tool will track the Salton Sea conditions and input the data to this habitat model. For this scope, it is assumed that a time series from SALSA2, or another updated product from DWR, will be used to track elevation and salinity of the Sea.

The anticipated subroutines contained in the model include:

- Available diversion water – compare the habitat water demand with the river flow and depth,
- Habitat water losses – compute the daily evaporation loss and seepage loss,
- Diversions and releases – calculate the pump or gravity diversion based on supply and capacity,
- Operations procedures – implement pond operations including releases,
- Construction cost – assign construction costs based on unit costs and number/size of facilities,

- Power cost – compute power cost associated with pump operations, and
- Output summary – the output will be written in the spreadsheet for comparison of simulations.

Figure 26. Southern End of Salton Sea with the Estimated Edge of Water for 2030 and 2050.

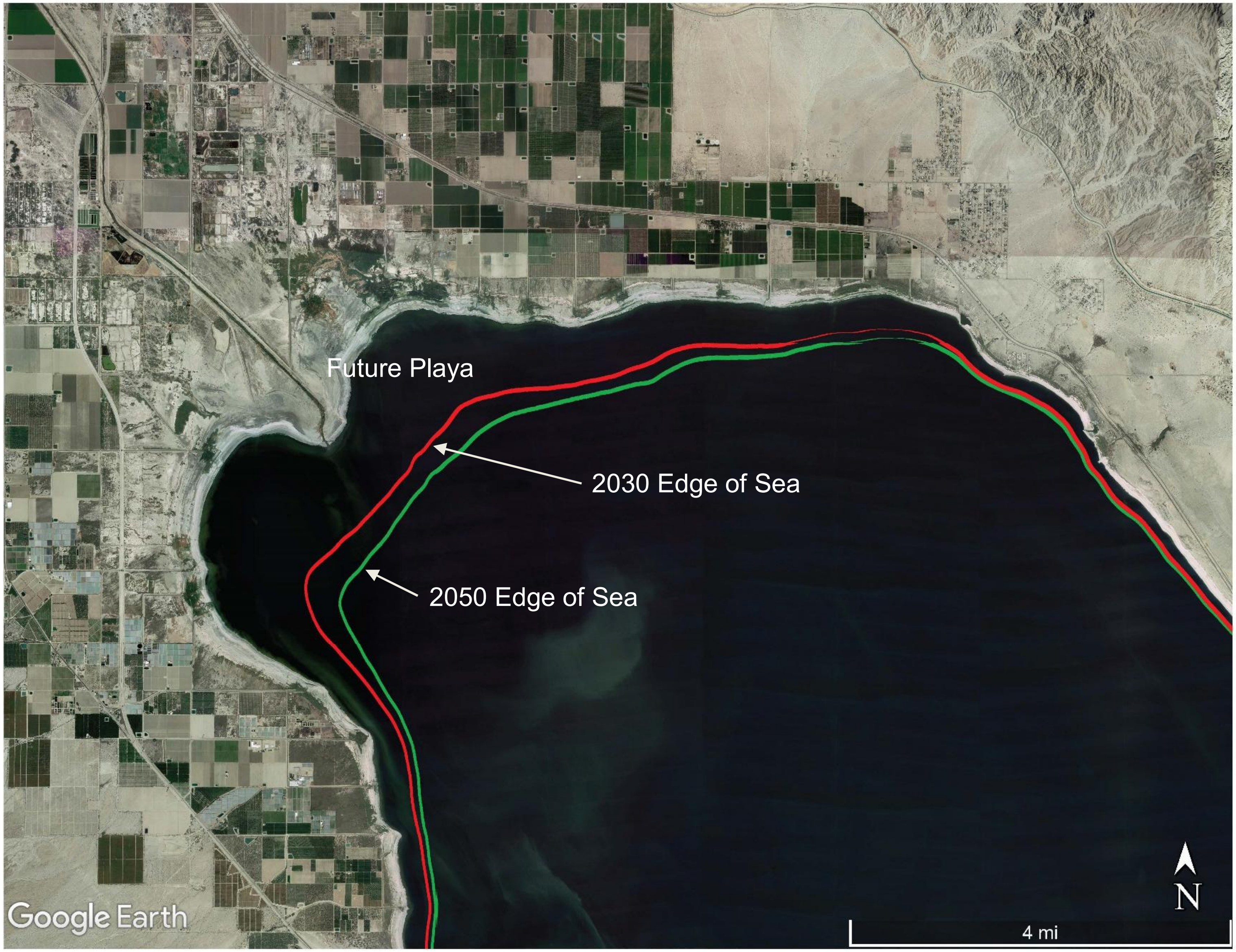

Figure 27. Northern End of Salton Sea with the Estimated Edge of Water for 2030 and 2050.

The habitat planning and design tool will use dialog boxes to assist with inputting data and accessing the output. The user will not need to search for the data or output, or risk placing data in the wrong cell. There will be a common access page for data and output and simulation.

Data Sources

Land surface information (playa topography and river cross sections) will be collected to describe conditions at habitat or water diversion sites. These data will be input to the model to allow computation of water depths across ponds or pumping lift at the rivers. Previous bathometric surveys conducted by Scripps and US Bureau of Reclamation will be used.

Other specific data sources include USGS, Imperial Irrigation District, and site observations by the modeler. These data include the following time series and point/paired data:

Operations Time Series Data

- Projected river flow (daily and peak flow for New, Alamo, and Whitewater rivers), and
- Projected Salton Sea elevation and salinity.

Operations Point/Paired data

- Average monthly precipitation and evaporation rates,
- Habitat pond geometry (depth, area, storage curves),
- River geometry at diversion point,
- Start and end dates for simulation,
- Seepage loss rate,
- Diversion capacities (River and Sea),
- River salinity and Sea salinity,
- Habitat monthly storage targets
- Habitat outflow capacities, and
- Monthly scaling factors for hydrologic data.

Cost Point Data

- Unit costs for constructed features,
- Berm characteristics (height, base, top width),
- Pipeline specifics (size. type, length), and
- Unit costs for power.

The above lists represent a partial summary of input data and parameters. Additional data and operational parameters will be added as specific routines are added to the model.

General Model Operation

For a given habitat to be modeled, the user would first enter the characteristics of the habitat. These characteristics include the depth/area/storage curve for the pond, lineal feet of berm, berm characteristics, physical diversion and release facilities, and other stationary features (common throughout this concept). Then the operational features are entered. This includes operations targets such as capacity, residence time, pond salinity, and on/off sequence for pump operation. Figure 28 shows a concept layout of a group of habitat ponds and associated berms, pumps, and connections.

The model will then be run and the output checked for reasonableness. A series of simulations will be run with only changes to the variable operations features such as diversion rate. The output module will provide comparisons between multiple runs based on selected input parameters. Depending on the results of the assumed operation, the designer may choose to modify the habitat size, depth, or other characteristics before repeating the operations simulations. Typical outputs to consider in the assessment of a habitat concept are:

- Volume, area, and depth of stored water,
- Residence time of the stored water,
- Salinity of the stored water,
- Average pond conditions in specified months, and
- Total cost of the target habitat concept.

These output variables may be considered as an average by month or year, or at a point in time. For example, a habitat with deep water in part of the year and shallow water in another part could be simulated as compared against maintaining a constant storage.

Model Output

The model output will occupy several sheets of the spreadsheet and be accessible from a common output page. The output will include time series data for water storage, depth, salinity, and residence time in the modeled habitat. Besides the time series data, there will also be monthly and annual summaries of these data along with other output such as power use, operation pump information, and operations.

The time series output can also be used as input to a new simulation run for an adjacent habitat that receives water from the modeled habitat. This allows for linking of habitats where one pond feeds water and salt to another pond.

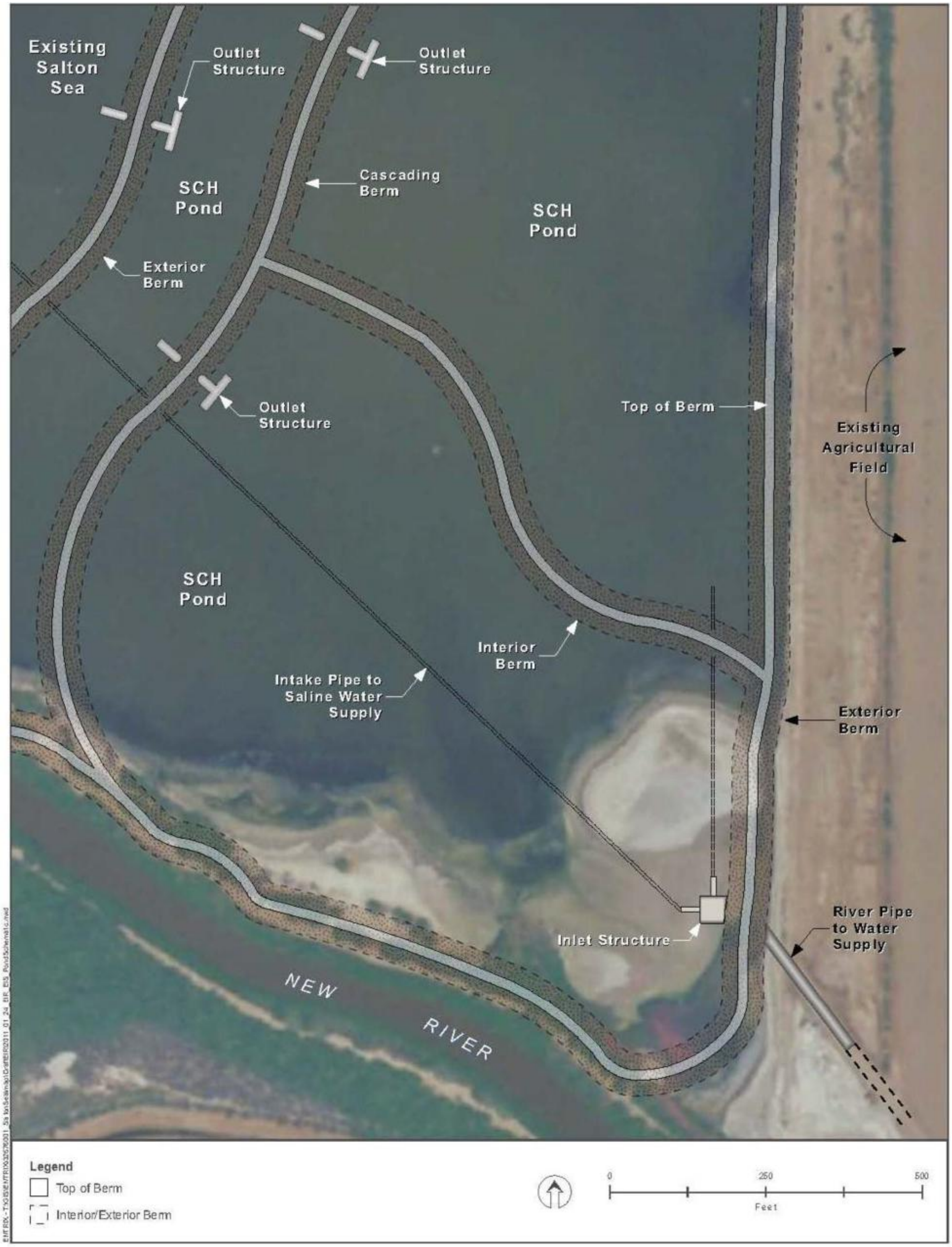

Figure 28. Multi Facility Habitat Concept Developed for SCH.

Model Assumptions

The model assumes:

- A daily time step,
- Mass balance calculations for movement of water and salt,
- Future hydrologic and Sea conditions are defined by the SALSA2 model run externally from this habitat model,
- Operational and climatic values are input at a monthly time step and extrapolated to a daily,
- Salinity is conservative,
- Salt is not lost to evaporation but is lost to seepage.

Outcomes and Deliverables

The model will be used as part of the design and operations process to help develop and assess design concepts. The model user can input a set of assumption, check the results and modify the assumptions to simulate changes to the assumed habitat. This iterative process will be used to fine-tune the design. This model does not have a built-in optimization routine but rather the design engineer varies the input to find the optimum design.

The model results are tabulated and will be included in summary descriptions of the design concepts. Tetra Tech will also prepare a modeling memo develop that explains and summarizes the model results.

Chapter 5. Air Quality Management

Overview

The State will play an integrating role in a coordinated program to manage dust emissions as the Sea becomes smaller and playa becomes exposed. Close coordination with local agencies will be important to the success of the program. A description of the regulatory setting, the roles of the local agencies and an inventory and evaluation of on-going dust mitigation efforts is provided in this chapter. Information from specific plans regarding spatial variations in sediment characteristics and soil erodibility or temporal variations in factors contributing to the formation and erodibility of salt crusts will be reviewed and updated as part of the mitigation process. An analysis of how Salton Sea management efforts may affect dust mitigation emissions under forecasted scenarios is included.

Goals and Objectives

The State's objective will be to play an integrating role in a well-coordinated program to manage dust emissions as the Sea becomes smaller and playa becomes exposed. The State will coordinate with the Imperial Irrigation District (IID) and their consulting team, Imperial County Air Pollution Control District (ICAPCD), Water Transfer Joint Powers Authority (JPA), and South Coast Air Quality Management District (SCAQMD) to integrate compatible dust suppression pilot projects into Phase I of the SSMP. Data will be gathered that will help inform the regulators of the potential for the techniques to be approved as Best Available Control Method (BACM) The State will coordinate with JPA partners to implement the SSMP air quality mitigation program.

Efforts are underway to determine if accelerating portions of the air quality mitigation program are warranted. This coordination will be conducted through the existing Water Transfer Joint Powers Authority budget process and the existing mitigation development program for the water transfer. This process will follow the four-step air quality mitigation guidelines outlined in the QSA Water Transfer environmental documentation and discussed below.

Regulatory Setting

The Salton Sea's location encompasses the Salton Sea Air Basin (Basin), under the jurisdiction of two districts: ICAPCD, southern Basin, and SCAQMD, northern Basin. The Basin is subject to regulations under the Federal Clean Air Act (CAA) and Clean Air Act Amendments (CAAA). In 1970 the United States Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for six "criteria" pollutants, included as National Standards in Table 2. Primary standards are established to protect human health, whereas secondary standards are established to protect degradation of the environment. The US EPA classifies regions as "attainment" or "non-attainment" depending on whether ambient air quality data collected from permanent monitoring stations meet requirements stated in the primary standards. The CAAA of 1990 requires states with nonattainment areas to achieve NAAQS by developing an EPA-Approved State Implementation Plan (SIP) and calls for specific emission reduction goals.

Table 2. Ambient Air Quality Standards

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS		NATIONAL STANDARDS	
		PPMV	mg/m³	PPMV	mg/m³
Ozone (O_3)	1-hour	0.09	177		
	8-hour	0.07	137	0.075	147
Nitrogen Dioxide (NO_2)	1-hour	0.18	339	0.1	188
	Annual	0.03	57	0.053	100
Sulfur Dioxide (SO_2)	1-hour	0.25	655	0.075	196
	3-hour (secondary)			0.5	1,300
	24-hour	0.04	105		
	Annual			0.03	79
Carbon Monoxide (CO)	1-hour	20	22,898	35	40,071
	8-hour	9	10,304	9	10,304
	Lake Tahoe (8-hr)	6	6,869		
Particulates (as PM_{10})	24-hour		50		150
	Annual		20		
Particulates (as $PM_{2.5}$)	24-hour				35
	Annual		12		12
Lead (Pb)	30-day		1.5		
	3-month (rolling)*				0.15
Sulfates (as SO_4)	24-hour		25		
Hydrogen Sulfide (H_2S)	1-hour	0.03	42		
Vinyl Chloride (C_2H_3Cl)	24-hour	0.01	26		
Visibility Reducing Particulates	8-hour	Extinction coefficient of 0.23 per kilometer; visibility of 10 miles or more due to particles when relative humidity is less than 70 percent)			

Sources: Adapted from SCH Final EIR/EIS; CARB 2010; USEPA 2010

Notes: ppmv= part(s) per million by volume, µg/m3=microgram(s) per cubic meter

*The 1.5 µg/m3 Federal quarterly lead standard applied until 2008; 0.15 µg/m3 rolling 3-month average thereafter

For gases, µg/m3 calculated from ppmv based on molecular weight and standard conditions (Temperature 25°C, molar volume 24.465 liter/g-mole)

The General Conformity Rule (Section 176(c)(1) of the CAAA (42 USC section 7506(c))) prohibits the Federal government from “engag[ing] in, support[ing] in any way, or provid[ing] financial assistance for, licens[ing] or permit[ing] or approv[ing] any activity” that does not conform to an EPA-approved SIP. Thus any Federal agency involved in the management activities must not undermine SIP efforts in the area. A conformity review may be required if the Federal action will take place in a Federal non-attainment or maintenance area, and if the action would result in significant emissions of an air pollutant that is regulated due to the non-attainment or maintenance status of the region. If the emissions are expected to be significant, then it must be determined if the threshold levels would be exceeded. A conformity review is required if the threshold levels would be met or exceeded (40CFR section 93.153(b)).

States have the right to establish and enforce their own air quality standards, provided they are equal to or more stringent than the Federal standards. The California Clean Air Act (CCAA) of 1988 (California Health and Safety Code 25 section 39600 et seq.) called for similar designations of areas as attainment or non-attainment based on California standards and requires air quality plans with a range of control measures to reach attainment for ozone, carbon monoxide, nitrogen oxides (NOx), and sulfur dioxide (SO_2). The California Air Resources Board (CARB) is the agency tasked with regulating air quality by setting standards for emissions and regulations for mobile emission sources (i.e. autos, trucks).

The pollutants of greatest concern in the Basin are: PM10 and PM2.5 (particulate matter less than 10 and 2.5 microns, respectively, from wind erosion (fugitive dust), soil disturbance and fuel combustion), ozone and ozone precursors, NOx, and volatile organic carbons (VOCs)(primarily from vehicle and equipment exhaust). Agriculture and transported pollutants from Mexico contribute to the air quality problems in the area (USGS 2013).

As the Salton Sea recedes due to declining inflows, windblown dust emissions from the exposed dry lakebed (the playa) will increase in some areas. This will lead to a potential human health risk, since a significant portion of this windblown dust is PM10; particulate matter with an aerodynamic diameter of 10 micrometers or less that are small enough to be inhaled. Imperial County is designated as a serious non-attainment area for PM10 (i.e., the area does not attain federal or state air quality standards) and non-attainment for PM2.5 NAAQS. Imperial Valley is designated as a state non-attainment area for ozone and PM10. As such, the potential for creating sources of PM10 is a public health concern (IID 2013). Part of the 2009 PM10 SIP revision contains requirements for an air quality assessment, an emission inventory, BACM and Best Available Control Technologies (BACT), and transportation conformity budgets (CARB 2010).

Four Step Process. As a consequence of the QSA water transfers, CEQA guidelines sections 15091[d] and 15097 require that an agency adopt a program for reporting or monitoring mitigation measures that were adopted or made conditions of approval for a project. Such a program ensures the implementation of mitigation measures identified in an EIR, and IID created a Mitigation, Monitoring and Reporting Plan (MMRP) in 2003. According to the SWRCB Order and IID’s Water Conservation and Transfer Project

MMRP (IID, 2003; SWRCB, 2002), potential air quality impacts from exposed Salton Sea playa must be monitored and mitigated by implementing the following four steps:

1. **Restrict public access**. Minimize disturbance of natural crusts and soil surfaces in exposed shoreline areas;
2. **Research and monitoring**. Conduct research to find effective and efficient dust control measures for the Exposed Playa, develop information to define the potential problem over time, and monitor the surrounding air quality;
3. **Emission reduction credits**. If monitoring results indicate exposed areas are emissive, create or purchase offsetting emissions reductions as part of a negotiated long-term program; and
4. **Dust control measures**. To the extent that offsets are not available, implement dust control measures (with feasible dust control measures and/or supplying water to re-wet emissive areas) on the emissive parts of the exposed playa.

The term “emissive” indicates that the land surface has a tendency to release enough dust to constitute or contribute to an air quality violation. “Non-emissive” is used to describe surfaces that do not emit sufficient dust to cause or contribute to air quality violations. All management alternatives must contain Air Quality Management actions related to this four-step process.

Access to exposed playa will be controlled in coordination with landowners and stakeholders to avoid disturbance and resulting emissions. In concert with the MMRP, a research program focusing on the development of cost effective, water efficient, and adaptive Air Quality Management has been initiated and will continue. In the long run, results of this effort will guide the Air Quality Management approaches implemented at the Salton Sea (IID 2013).

The SWRCB Order approving the water transfer (Order WRO-2002-0013) requires IID to evaluate dust control measures to determine feasibility in consultation with the Imperial County Air Pollution Control District, the South Coast Air Pollution Control District and the California Air Resources Board (IID 2013).

Prior Work

Ongoing efforts to characterize the air quality at the Salton Sea are briefly discussed below. Significant data disparities exist regarding the extent and variability of Salton Sea playa emissivity (dust-emitting), future emissivity, and dust loading of PM_{10} in the region (Cohen 2014). Exposed playa is expected to increase exponentially in area over the next 15 years, creating a significant health risk that has yet to be fully characterized.

IID Dust Mitigation Plan

IID’s JPA Dust Mitigation Plan includes an adaptive management framework to monitor ambient air quality, research and monitoring efforts to identify and map playa surface characteristics related to erosion and emission potential. Pollutants of concern include PM_{10}, $PM_{2.5}$, ozone, hydrogen sulfide, arsenic, Se and others.

The IID Air Quality Mitigation Program contains four components that contribute toward the implementation of a science-based adaptive management plan to detect, locate, assess and mitigate PM_{10} emissions associated with the Water Transfer Project. Each component of the Air Quality Program will attempt to answer a set of questions or achieve a goal. The **Air Quality and Playa Characterization** component seeks to differentiate the emissions sources, whether they are a direct consequence of the Water Transfer Project or not by analyzing data from an extensive ambient air quality monitoring network. In order to capture intermittent dust events, PM_{10} and $PM_{2.5}$ will be measured with continuous monitors (i.e. Tapered Element Oscillating Microbalance Monitor (TEOM) or a Beta Attenuation Monitor (BAM)) and verified with filter-based federal reference method monitors (i.e. BGI or Partisol). The filters could initially be analyzed for contaminants (i.e. arsenic, Se, pesticides) at regular intervals to characterize the problem of contaminated dust particle transport (IID 2013). Permanent and portable air quality stations will be used as necessary to document the spatial heterogeneity of dust emissions.

In the future, ambient air quality data will be used to assess the occurrence and magnitude of emissions from newly exposed playa and existing emission sources. This information will aid the development of a dust identification methodology to identify playa emission source areas, estimate emission characteristics and determine downwind impacts. Drawing from existing dust identification programs such as Owens Lake and forming new methodologies as necessary, the program will integrate information from research and monitoring efforts (IID 2013).

Hydrologic modeling will use the hydrologic analysis from the Water Transfer EIR/EIS and high-resolution bathymetry data to yield the estimated extent and time frame for additional playa exposure. The result will be planning level information about the location of projected playa exposure and ownership information. Research and monitoring will aid the understanding of salt crust formation, vulnerability to erosion and overall emission potential of various salt crust surfaces. The potential sources of PM_{10} emissions include playa salt crusts, sand sheets, beach deposits and soil surfaces. The main focus of research will be assessing the vulnerability of each potential emission source to erosion. This component also aims to identify specific areas of exposed playa that are emissive and source areas associated with erosion events. Properties to be mapped include crust type, crust thickness, soil moisture, crust relief, crust hardness, penetration resistance, surface erosion, free surface sand, percent vegetation, overflow and other features. Meteorological conditions, such as wind, precipitation, temperature and relative humidity, will be monitored and analyzed to determine environmental and climatic events that affect emission potential seasonally (IID 2013).

The **Dust Control Measure (DCM) Research and Monitoring** component will test and evaluate DCMs for feasibility and cost-effectiveness. Existing DCMs will be derived from a literature review, modeling studies and screening-level tests. Novel and untested measures will be incorporated into the DCM research via pilot field testing. The performance of DCMs will be monitored at the pilot project scale for overall performance and sensitive parameters such as habitat quality. DCM selection will be guided by the following principles:

1. Effective dust control is achieved by a combination of:
    a. Physical stabilization of the playa surface
    b. Reduction in wind velocity at the playa surface
    c. Enhanced net-sand capture rates
    d. Visual observations
2. DCMs should enable constant dust control
3. Dust control should be based on achieving target level of emission control on a preventative, macro scale (not reactive, micro scale)
4. Water-based DCMs are effective and where practical water based habitat will be used as a dust suppression technique
5. DCMs that are designed to interrupt fetch and saltation protect downwind surfaces and capture sand are important low water use options
6. DCMs with salt- and drought- tolerant vegetation can be challenging to establish and sustain, but are more water efficient and provide effective dust control

Other Studies

Ambient air quality monitoring is critical to establish a baseline for the comparison to future actions and conditions. The USGS Ecosystem Monitoring and Assessment Plan report (2013) recommends focusing air quality studies to address the following:

- Measurements of upper air meteorological conditions.
- Use of remote sensing and satellite imagery to track changes in exposed Salton Sea shoreline areas.
- Back-trajectory analysis to predict the sources of monitored particulate matter.
- Development and pilot testing of a “toolbox” of possible dust control measures.
- Investigations of potential odorous emissions.
- Identification of needed tools and models to support future studies.
- Estimation of greenhouse gas emissions from management activities.
- Evaluation of potential effects of global climate change on the Salton Sea and the Salton Sea Air Basin.

Findings from Buck *et al*. (2011) indicate that areas where the hydrous/anhydrous minerals are dominant were the most likely to result in highly emissive surfaces and are exacerbated by high water tables. However King et al. (2011) did not find a significant correlation between salt content and emissivity but determined that dry washes (sand-sized particles with little silt/clay crust) were the largest source of PM_{10} emissions compared with any other playa type. More studies are necessary to determine a causal relationship between existing and future playa characteristics and emissivity.

Approach

The State’s SSMP air quality mitigation program will include coordination with IID, Coachella Valley Water District, QSA Water Transfer Joint Powers Authority, SCAQMD, ICAPCD, and CARB to develop BACM and to further develop and implement the emission monitoring process. The Salton Sea Air Quality Mitigation Program (IID July, 2016) contains more details on the air quality mitigation effort.

The SSMP envisions a mix of both water-dependent and waterless dust suppression projects in all phases of the SSMP. Ongoing evaluations of the criteria for determining which dust suppression techniques will be used in specific areas will continue as the QSA Water Transfer Air Quality Mitigation Program and the SSMP are developed. Some of the techniques, such as enhanced vegetation, could be considered waterless measures if designed to intercept the groundwater level, but they would require surface water for establishment. Many of these techniques are currently being evaluated for efficacy and longevity in the 2003–2018 playa exposure zone. Most of the methods have not been in place long enough to determine longevity or durability, but evaluations will continue.

Potential DCMs are discussed below and include surface stabilizers, vegetated swales, plant community enhancement, moat and row, water-efficient vegetation, tillage, alternative land use, species conservation habitat and other habitat-based uses (IID 2013).

Potential DCMs

Surface stabilizers are commonly used to suppress dust on disturbed lands including unpaved roads and construction sites. They are usually applied topically and can consist of water, salts and brines, organic non-petroleum products, synthetic polymers, organic petroleum products, or mulch and fiber mixtures. Surface stabilizers change the physical properties of the soil surface to reduce dust by forming crusts or protective surfaces on the soil, causing particles to agglomerate, or attracting moisture to the soil particles. Surface stabilizer efficacy varies with the stabilizer type, environmental conditions, soil type, weather, application rate, and application frequency.

Habitat swales are earthen channels with vegetation constructed by raising pairs of parallel berms, with adjacent pairs of berms. Habitat swales interrupt wind fetch (the distance that wind has traveled over an unobstructed area) on the playa, which reduces wind velocity at the soil surface and suppresses sand flux and dust emissions in downwind areas. Vegetated swales capture sand beneath the plant community's canopy. Regional dust suppression results due to periodic surface wetting, natural crusting, reduced sand motion, and reduced surface wind velocities due to sheltering of areas downwind of the swales.

With habitat swales, existing vegetation can be leveraged as the Sea recedes to enhance dust suppression. Plant communities will follow successional patterns as the shoreline is exposed. Favorable growing conditions will exist where freshwater inflows create fresher, shallow groundwater and/or leach salts from newly exposed playa. Sedges, rushes, and similar wetland vegetation will likely appear near the wet shoreline if wetted by freshwater; grasses and other herbaceous species near the middle of the landscape; and shrub species in drier areas near and above the historic shoreline. These plant communities can achieve plant cover densities that postpone or eliminate the need for more resource-intensive DCMs, but are likely limited to freshwater-wetted zones.

Moat and row consists of an array of earthen berms (rows) flanked on either side by ditches (moats). Moats capture moving soil particles and the rows physically shelter the downwind playa by lifting wind velocity profiles above the soil surface. Moats and rows are designed to run perpendicular to primary wind vectors. The efficacy of this DCM can be enhanced by reducing the distance between rows, increasing the height of the rows, vegetating rows, or using gravel, sand fences, etc. to enhance sand capture.

Water-efficient vegetation stabilizes and suppresses soil and sand movement beneath the canopy of salt- and drought tolerant species on playa surfaces. Similar to a habitat swale, vegetation is seeded or planted and irrigated on raised beds spaced 5-15 ft. apart. Findings from the literature indicate the most desirable species for dust control are salt- and drought-tolerant, may be rhizomatous (growing by the spread of underground roots and shoots), and must provide adequate cover even during dormant periods.

Native shrubs such as salt bushes (*Atriplex* spp.) and seepweed (Suaeda moquinii) may be used alone or in combination with the common Saltgrass (*Distichlis spicata*). A mix of native species will provide the needed diversity to maintain adequate cover levels, reduce water demand, and suppress invasive species. Research is necessary to assess the dust control and economic efficiency of different levels of infrastructure, vegetation density, and vegetation uniformity.

Tillage involves roughening the land surface, which creates furrows that capture sand and lifts the boundary layer of moving air further above the land surface, thereby reducing erosion. Tillage may need to be repeated periodically to reverse land smoothing by erosion, sedimentation, and settling.

Tillage can be optimized to minimize turning and avoid traffic on untilled areas by tilling in blocks or strips. Tillage has some significant cost and operational advantages over other dust control approaches. Relative to other DCMs, it can be designed and installed at a fairly low cost with common implements used in agricultural production. However tillage needs to be conducted in a way that minimizes dust production. Tillage configurations are currently being evaluated for dust control at Owens Lake, and the results will be useful for implementation at the Salton Sea.

Alternative land use practices can cover exposed playa and eliminate or significantly mitigate the potential for emissions. Some relevant land use practices include the following:

- **Agricultural land**. Portions of exposed playa may be reclaimed for more conventional agricultural activities, including graminoid forage crops typically grown in the Imperial Valley, or aquaculture crops, such as algae. These crops may be harvested for protein (food) or used as biomass for energy conversion.

- Constraints on expanding agriculture onto exposed playa include soil salinity, irrigation infrastructure, irrigation water availability, and agricultural markets. Soil types are a major consideration: non-hydric and moderately to well drained soils found west of the New River delta are suitable for farming, and less suitable soil types can be used for aquaculture farming (i.e. algae and other aquatic vegetation). IID is evaluating areas around the Sea for potential agricultural activity.
- IID is also evaluating several halophytic plants that might be suitable for crop use in playa areas with high salt content soils.
- **Energy Generation Projects**. Energy generation projects including geothermal and solar may also be located on exposed playa and could, with prior planning and design modification, be co-located with habitat projects.
- **Geothermal:** The Refined Conceptual Modeling and a New Resource Estimate for the Salton Sea Geothermal Field, Imperial Valley, California (Hulen, et al. 2002 as cited in IID 2013) estimated a more extensive geothermal resource at the Salton Sea than previously thought. The "Salton Sea Shallow Thermal Anomaly" is mapped from east of the New River delta, through the Alamo River delta area and the Morton Bay/Mullet Island area and along the east side of the Salton Sea to the Imperial Wildlife Area-Wister Unit. The potential geothermal area extends out into the Sea up to three miles in some areas.
- **Solar**: Two types of solar energy recovery are being considered for installation on exposed playa: photovoltaic panel technology and solar gradient ponds.
    - **Photovoltaic panel technology** is a relatively well proven technology, but it has not been tested in the extreme environment of the Sea playa.
    - **Solar gradient ponds** extract energy by using solar rays to heat the lower water layer in a stratified impoundment. This technology has been moderately successful in other areas, but it has not been tested in the Imperial Valley.

Biological habitat can also cover exposed playa and eliminate or significantly mitigate the potential for emissions. Many habitat management projects are proposed in the Salton Sea area in an effort to sustain the fish and wildlife currently dependent on the Sea. Some of these projects will extend onto areas of the playa that would otherwise be exposed.

Dust Prevention and Mitigation

A dust prevention and mitigation component will be included to evaluate whether dust emissions including from off-highway vehicle (OHV) use can be prevented or mitigated. Off-highway vehicles cause considerable surface disturbance and erodibility. An adaptive management framework will be in place to prevent dust emissions from OHVs. Dust mitigation strategies include creating or purchasing off-setting emission reduction credits, similar to a cap-and-trade program and direct emissions reductions at the Sea. IID would negotiate with the local air pollution control districts to create a long-term program that would enable the creation or purchase of off-setting PM_{10} emission reduction credits (IID 2013).

In addition to air quality emissions from the Sea area reduction, air quality may be effected by the construction and operation of SSMP elements, as a result of equipment exhaust and fugitive dust emissions. Habitat management will reduce dust emissions in the long term by covering exposed playa. Ecosystem management activities could also affect the levels of hydrogen sulfide released from geothermic and biogenic sources in the Salton Sea (USGS 2013).

Locally, ICAPCD is responsible for regulating air quality within the southern Basin and has established Regulation VIII, Fugitive Dust Control Measures. It specifies standard measures required at all construction sites to reduce PM_{10} emissions. Every management scenario will be subject to ICAPCD's Fugitive Dust Control Measures, in addition to the measures required by the ICAPCD's CEQA Air Quality Handbook and the ICAPCD's Policy 5 to further minimize impacts from NOx and PM_{10} emissions. Rules and other regulation requirements can be found in the Imperial County 2009 PM_{10} SIP. Relevant measures identified by the SCH Final EIR/EIS include:

Other Fugitive Dust (PM_{10}) Control Measures

- Expose soil with water at an adequate frequency to keep it continually moist so that visible dust emissions would be limited to 20 percent opacity for dust emissions at all times (at least twice daily and as indicated by soil and air conditions).
- Replace ground cover in disturbed areas as quickly as possible.
- Limit vehicle speed for all construction vehicles to 10 miles per hour on any unpaved surface at the construction site.
- Develop a trip reduction plan to achieve a 1.5 average vehicle ridership for construction employees.

Diesel Control Measures (to Reduce PM_{10} and NOx Emissions)

- A schedule of low-emissions tune-ups will be developed and such tune-ups will be performed on all equipment, particularly for haul and delivery trucks.
- Low-sulfur (≤ 15 ppmw S) fuels will be used in all stationary and mobile equipment.
- Curtail construction during periods of high ambient pollutant concentrations as directed by the ICAPCD.
- Reschedule activities to reduce short-term impacts to the extent feasible.

Applicable Mitigation Measures from the Water Transfer EIR/EIS

Mitigation Measure AQQ-2: Implementation of BMPs during construction and operation would help to minimize PM_{10} emissions. BMPs could include, but are not limited to, the following (IID 2002):

- Equip diesel powered construction equipment with particulate matter emission control systems, where feasible.
- Use paved roads to access the construction sites when possible.
- Minimize the amount of disturbed area, and apply water or soil stabilization chemicals periodically to areas undergoing ground-disturbing activities. Limit vehicular access to disturbed areas, and minimize vehicle speeds.
- Reduce ground disturbing activities as wind speeds increase. Suspend grading and excavation activities during windy periods (i.e., surface winds in excess of 20 miles per hour).
- Limit vehicle speeds to 10 mph on unpaved roads.
- Cover trucks that haul soils or fine aggregate materials.
- Enclose, cover, or water excavated soil as necessary.
- Replant vegetation in disturbed areas where water is available, following the completion of grading and/or construction activities.
- Designate personnel to monitor dust control measures to ensure effectiveness in minimizing fugitive dust emissions.

Outcomes and Deliverables

The air pollutants of greatest concern in the Basin are: particulate matter (PM_{10} and $PM_{2.5}$) from wind erosion (fugitive dust), soil disturbance and fuel combustion, ozone and ozone precursors, nitrogen oxides (NOx) and volatile organic carbons (VOCs), primarily from vehicle and equipment exhaust. Agriculture and transported pollutants from Mexico contribute to the air quality problems in the area but the declining inflows and associated elevation decrease will increase windblown dust emissions from the exposed dry lakebed (the playa) in some areas. The PM_{10} emissions from exposed playa are a considerable human health hazard, and could also affect crop production and solar energy generation.

The State's coordinated air quality management approach will include an adaptive management framework to monitor ambient air quality, research and monitoring efforts to identify and map playa surface characteristics related to erosion and emission potential. While previous investigations have advanced the knowledge base about the playa, pilot projects are necessary to determine the potential for salt crust formation and a causal relationship between existing and future playa characteristics and emissivity.

In addition to air quality emissions from Sea area reduction, air quality may be effected by the construction and operation of SSMP elements, as a result of equipment exhaust and fugitive dust emissions. While habitat management will reduce dust emissions in the long term by covering exposed playa, detailed mitigation measures will be identified to reduce the potential impacts of construction activities.

Chapter 6. Environmental Compliance

Overview

The implementation of Phase I of the SSMP could require the acquisition of a number of permits from multiple local governments, local agencies, regulatory entities, and resource agencies. This chapter will summarize what environmental compliance documents have been completed to date for projects at or around the Salton Sea that have relevance to the SSMP. There are a number of projects that will be considered in order to understand the permitting requirements that have been placed on implementation efforts positioned on or near the exposed playa that have similarity to the components of the SSMP. It is critical that the requirements for working within the permitting environment of these distinct entities is fully understood in order to expedite implementation of the elements of the SSMP.

Goals and Objectives

This effort will guide the permitting process for the implementation of Phase I of the SSMP, area by area for all project elements, and will allow for the determination of the most effective and efficient strategy for permitting given the flexibility of the time frame and the element implementation of the project. When the existing regulatory documents have been reviewed, it will be possible to determine the best strategy for SMMP implementation. One desirable strategy could include a single programmatic document that would cover all Phase I implementation elements over a specified period of time. Another outcome could be the conclusion that sufficient environmental documentation for implementation of the areas and the elements of Phase I of the SSMP has already been completed associated with other projects or proposals. If that conclusion is reached, full justification for use of the prior document(s) will be detailed.

Prior Work

Regulatory Environment

Some of the projects implemented on or near the exposed playa in the Salton Sea region have involved both State and Federal entities, and so have required a combined environmental compliance document that includes the requirements of both the National Environmental Protection Act (NEPA) and the California Environmental Quality Act (CEQA). It is anticipated for the SSMP that both Federal and State environmental compliance would be necessary for at least some areas of implementation, so understanding how they can be combined most effectively is an important goal. In addition, the resource agencies, both State and Federal, are involved where project elements affect species that are listed as sensitive by either or both agencies. Water and wetland issues are also handled by both State and Federal agencies, under the California Department of Fish and Wildlife's Stream and Lake Alteration agreement (1600 process) and the State's Regional Water Quality Control Boards. The United States Army Corps of Engineers regulates impacts to wetlands and to Waters of the United States under the Clean Water Act.

In addition, permits, both discretionary and non-discretionary, will be required by Counties, and the area around the Salton Sea is in both Imperial and Riverside Counties. The region is governed under different air quality districts (ICAPCD and SCRAQMD), and involves two water districts (Imperial Irrigation District and Coachella Valley Water District) which have permitting requirements of their own. Finally, the affected region includes tribal lands of the Torres Martinez Band of Desert Cahuilla Indians.

Prior projects with environmental documents to evaluate

1. Salton Sea Authority. 2000. Salton Sea Solar Pilot Pond Project. Location: Shoreline near Niland Boat Ramp, east shore Salton Sea.
2. Bureau of Reclamation/Salton Sea Authority. 2000. Salton Sea Restoration EIR/EIS. Location: Within Salton Sea basin.
3. Bureau of Reclamation. 2000. Salton Sea Salinity Control Research Project. Location: Salton Sea Test Base, west shore of Salton Sea. (Permits acquired, but documentation has not been obtained).
4. Imperial Irrigation District et al. 2002. Implementation of the Colorado River Quantification Settlement Agreement. Program EIR. Location: Regional impact, including Salton Sea.
5. Torres Martinez. 2003. Treatment Wetlands Project. Location: West of Whitewater River delta, north shore of Salton Sea.
6. Bureau of Reclamation. 2005. Salton Sea Shallow Habitat Pilot Project. Location: North of Alamo River delta, southwest shore of Salton Sea.
7. Department of Water Resources Salton Sea Ecosystem Restoration Program Final Programmatic Environmental Impact Report (PEIR). 2006-2007. (CH2MHill). State of CA Preferred Approach for Salton Sea restoration.
8. Department of Water Resources. 2011-2013 Environmental Impact Statement/Environmental Impact Report for the Species Conservation Habitat Project (Cardno ENTRIX). Location: Southern Salton Sea playa region, New and Alamo Rivers.
9. Torres Martinez/Salton Sea Authority. 2013. Wetlands, Solar, and Geotube project. Location: Adjacent to original Torres Martinez Treatment Wetlands, north shore Salton Sea.
10. Imperial Irrigation District. Red Hill Bay Wetlands Restoration Project. 2013. Location: South of Alamo River, southeast shore of Salton Sea.

Approach

When these documents have been reviewed, the need for the development of a master CEQA+NEPA (EIR/EIS) document for Phase 1 of the SSMP will be evaluated. This evaluation will take into account the permit needs for individual SSMP project elements at each of the proposed areas, and will determine if multiple elements at multiple sites with similar permitting needs can be combined into a master project for which permitting strategies can be streamlined. The two most comprehensive documents (DWR PEIR 2007 and DWR EIR/EIS 2013) will be evaluated to determine if one or both of them cover sufficient issues as to make further environmental compliance analysis for the Phase 1 SSMP unnecessary. In particular, the work conducted in 2007 by

DWR/CH2MHill could merit interviews with some of the individuals who prepared that document. In addition, it is noted that DWR is already reviewing the applicability of the 2013 EIR/EIS for the SHC, and can be expected to conclude that there will be no need for further CEQA analysis for any project developed within the footprint of the project documented under that EIR/EIS. Areas proposed for development outside of the SCH area covered in that CEQA/NEPA document would require discussion of what other permits would be needed for any specific project element or footprint.

The approach will include a summary of relevant DWR legal analysis that has been performed to date. This analysis will be combined with the project area and element permit requirements to determine if one of the preferred outcomes for environmental compliance can be recommended: using existing prior environmental documents; or preparing a single new programmatic document for the entire Phase 1 of the SSMP. If neither alternative is possible, elements and/or areas that can be combined into a single analysis will be grouped into as few categories as the legal and permitting analyses permit, and the required level of documentation for each group will be described.

Outcomes and Deliverables

DWR anticipates that the existing SCH EIR/EIS will accommodate similar actions around the Sea under SSMP. Upon completion of the environmental compliance review, a technical memorandum will be prepared to support this position and identify any possible modifications that may be required.

Prior projects and their permitting needs and actions will be summarized in the memo, which will include an indication of how broadly applicable the documents are to the contemplated actions of the SSMP. The memo will note specific examples of any permitting strategies that could be applied to future work. These strategies are expected to include consideration of frequently occurring sensitive species such as desert pupfish (*Cyprinodon macularius*), Yuma Ridgway's rail (*Rallus obsoletus yumanensis*), California black rail (*Laterallus jamaicensis coturniculus*), and burrowing owls (*Athene cunicularia*).

The memorandum will identify similarities in permitting processes that have been common to a number of projects. An evaluation will be made of whether the project elements of the SSMP are sufficiently similar to each other, and to other programmatic approaches to large-scale Salton Sea project proposals, that a single programmatic permitting approach would be feasible. If any single document, or groups of documents, can be demonstrated to cover all of the issues faced by the Phase 1 SSMP, it will be argued that further CEQA/NEPA analysis is not needed, and that only element-specific permits such as those required for construction would be needed.

The outcome of this analysis will be a CEQA/NEPA compliance strategy that is appropriate for the SSMP.

Chapter 7. Compatibility with Other Regional Plans and Projects

Overview

The area around the Salton Sea encompasses a region that includes a number of discrete jurisdictions that produce planning documents relevant to the implementation of Phase 1 SSMP. As described in chapter 6, the lands in the Phase 1 planning area are in both Imperial and Riverside Counties, are governed under different air quality districts, have guidance for habitat and species conservation developed under separate Habitat Conservation Plans, involve two water districts (Imperial Irrigation District and Coachella Valley Water District), include tribal lands of the Torres Martinez Band of Desert Cahuilla Indians, and have two different Integrated Regional Water Management Plans (IRWMPs). There are, therefore, a large number of regional planning documents to be evaluated for their compatibility with the SSMP goals and objectives. This chapter describes the existing documents to be considered, and presents an approach for determining how best to incorporate them into the SSMP planning process. Full citations to all relevant documents in the public domain are provided in the References section.

Goals and Objectives

This chapter identifies common themes in other plans and similarities with SSMP goals and objectives, and proposes the optimal method of assuring project compatibility of Phase 1 of the SSMP with existing planning documents. It will serve as a guide to planners and permittees as opportunities for implementation of the planned elements of Phase 1 of the SSMP are considered. It will identify potential conflicts between the SSMP and other planning documents, and will identify strategies for their resolution.

Prior Work

There are a number of regional planning documents that will need to be considered for consistency with the SSMP. These document have been prepared to manage water quality, water supply, air quality, habitat protection, and economic development. They are grouped below by region or jurisdiction of origin.

1. Multi-state regional plans
    a. Desert Renewable Energy Conservation Program (DRECP)
2. California regional plans
    a. IRWMP Imperial
    b. IRWMP Riverside
    c. South Coast Air Quality Management District
    d. Coachella Valley Multiple Species Habitat Conservation Plan
3. Imperial County
    a. General Plan
    b. Strategic Plan
    c. Stormwater Management Plan
    d. Imperial County Air Pollution Control District
4. Riverside County

    a. eRED
5. Torres Martinez
6. Salton Sea Authority
    a. Salton Sea Funding and Feasibility Action Plan
    b. NRCS Salton Sea Water Quality, Air Quality and Agricultural Wetlands
7. Coachella Valley Water District
    a. Eastern Coachella Valley Stormwater Master Plan
    b. Coachella Valley Water Management Plan
8. Sonny Bono National Wildlife Refuge
    a. Sonny Bono Final Comprehensive Conservation Plan
9. Imperial Irrigation District
    a. Salton Sea Renewable Resources and Environmental Initiative. 2016
    b. Imperial Irrigation District Multi Species Habitat Conservation Plan
10. United States Geologic Survey
    a. USGS. Salton Sea Ecosystem Monitoring and Assessment Plan. 2013
    b. USGS. State of the Salton Sea: A Science and Monitoring Meeting of Scientists for the Salton Sea. 2017

Approach

There are two planning documents that relate very directly to the SSMP: the IID's Salton Sea Renewable Resources and Environmental Initiative (Initiative) and the Salton Sea Authority's Salton Sea Funding and Feasibility Action Plan (Action Plan). Together, these documents detail actions that can be taken in an incremental fashion all around the Salton Sea to promote renewable energy in concert with project elements that provide habitat and/or dust suppression as the Salton Sea recedes. The documents for these two strategies have already described in detail project elements that are very similar to those contemplated by the SSMP. Preliminary efforts have been included in these documents to determine compatibility with other regional planning activities. They will form the beginning of the compatibility analysis.

Outcomes and Deliverables

The compatibility analysis will involve and evaluation of the documents listed, and any others that come to light during the chapter preparation, resulting in a table that compares the planning objectives of each document to those of the SSMP. The table will be created using existing information in the Initiative and the Action Plan. Only provisions of the planning documents that relate to, or conflict with, SSMP implementation will be included in the table. A summary of the information will present identified conflicts between the planning documents and the Phase 1 SSMP project, and will suggest ways of resolving those conflicts with the agencies involved.

Chapter 8. Additional Projects for Evaluation

Overview

The focus of this task is on describing the feasibility evaluation of additional projects that may be envisioned beyond the initial 10-year phase of the SSMP. In relation to these projects, the work to be performed will include preliminary engineering, planning and cost estimation to help evaluate the potential for future development. Two project categories that have been identified at this time are: additional inflow options through pipelines/canals, and habitat creation along the eastern and western shores of the Salton Sea. Other reasonable solutions for Salton Sea restoration may also be investigated through this process.

Additional Inflow Options

Proposals have been developed in the past to exchange water from the Sea with other water bodies. For example, import/export pipelines could convey water from the Salton Sea to the Gulf of California and return water from the Gulf to the Sea. Pumping water from the Sea removes salt laden water and thus reduces the amount of salt and salinity in the Sea. Using other pipelines, water would then be pumped into the Sea to help maintain elevation. The water surface elevation of the Salton Sea would depend on a balance between water coming into the Sea and water leaving the Sea. Natural inflow, precipitation, and import quantities would be balanced by evaporation and export quantities. Likewise, salinity in the Sea would depend on the balance of salt coming in and salt going out. This alternative has two options: one would have pipelines to pump water in both directions, and another would use pipelines combined with channels. It has been estimated that pump-in/pump-out scenarios could cost in the tens of billions of dollars and would face significant permitting challenges due to the international issues involved in developing a project that crosses into the Federal Republic of Mexico.

Habitat Creation along the Eastern and Western Shores of the Salton Sea

Primarily because of water availability and bathymetry, the Phase I projects are situated along the northern and southern ends of the Sea. The primary riverine inflows occur at both ends, and are a requirement for habitat development at brackish water salinities by blending of river and Sea water. Standalone habitats cannot be developed in the eastern and western shores because of the absence of reliable freshwater supply. In addition, the steep bathymetry along these shores means that a relatively small amount of area will be exposed in these regions by 2028. For these reasons, the Phase I projects did not target the eastern and western shores. Over the longer term, however, there may be significant merit to developing habitat in the regions, potentially by developing a surface water connection or channel to the habitats and storage/pumping infrastructure created in the vicinity of the New and Whitewater Rivers.

Implementation work for the eastern and western shores is not envisioned as part of this Work Plan, but additional analysis may be performed to evaluate the overall feasibility of such development. A preliminary engineering evaluation of a “perimeter lake” concept was prepared by Tetra Tech (2016) for the Salton Sea Authority, and may serve as the starting point for any additional feasibility analysis.

Harbor and Ancillary Facilities

In conjunction with the evaluation of eastern and western shores of the Salton Sea, the potential for reconnecting, inundating, or treating harbors and boat docks along the east and west sides of the lake will be investigated as part of the SSMP. The investigation will include an evaluation of the potential that these types of measures could also reduce odor and vector issues. In some cases, this could include making the harbor functional for shallow draft boats.

SECTION III: ACTION PLAN FOR PRIORITY AREAS

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Chapter 9. New River West and East

Summary

This chapter describes work related to the assessment of habitat availability, type, water use, and acreage on the west side of the New River, based on a projected recession of the Salton Sea. The model described in Chapter 4, will be used to help develop conceptual plans for development of habitat at the New River West. The potential land uses on the west side include reclaimed farming, air quality management, shallow water habitat, deep water habitat, and water supply storage. A key element of the analysis is to determine the optimum method of delivering water to the various habitats, including independent conveyance or passing water through habitats, and to the creation of habitat features that can function effectively even with variations in inflows.

Goals and relationship to SSMP

This analysis will support the SSMP by identifying a combination of habitats that can be economically constructed and provide the targeted habitat acreage in the SSMP 10-year plan. Combinations of wet and dry habitat that can reasonably be served from the water supply ponds will be assessed. In addition, conveyance routes to move water between ponds or deliver water to specific ponds that minimize pumping to lift the water will be evaluated. To accomplish this, the ponds must be aligned to allow gravity flow.

The goal of this work is to analyze and select various land use combinations that meet the acreage goals of the 10-year plan that can be presented as three design concepts for New River West.

Prior Work

The Salton Sea Renewable Resources and Environmental Initiative explored options for habitat and water supply development at New River West for the next 10 years. The previous analysis looked at supplying water to a chain of wet habitats with dry habitats nearby.

The SCH project includes the analysis, environmental compliance, and permitting of habitats on the west side of the New River that will be used in this analysis (Figure 29).

This task will build on the previous work using the model developed in Chapter 4. This work will develop two additional concept designs in addition to building on the layout developed by IID.

Approach

The analysis will use the 2028 projected Salton Sea elevations and stream flows and also consider the land ownership for placing habitats. Factors to consider with the model include:

- Estimating the required size of water storage facilities,
- Incorporating water conveyance between ponds into the selected habitat,

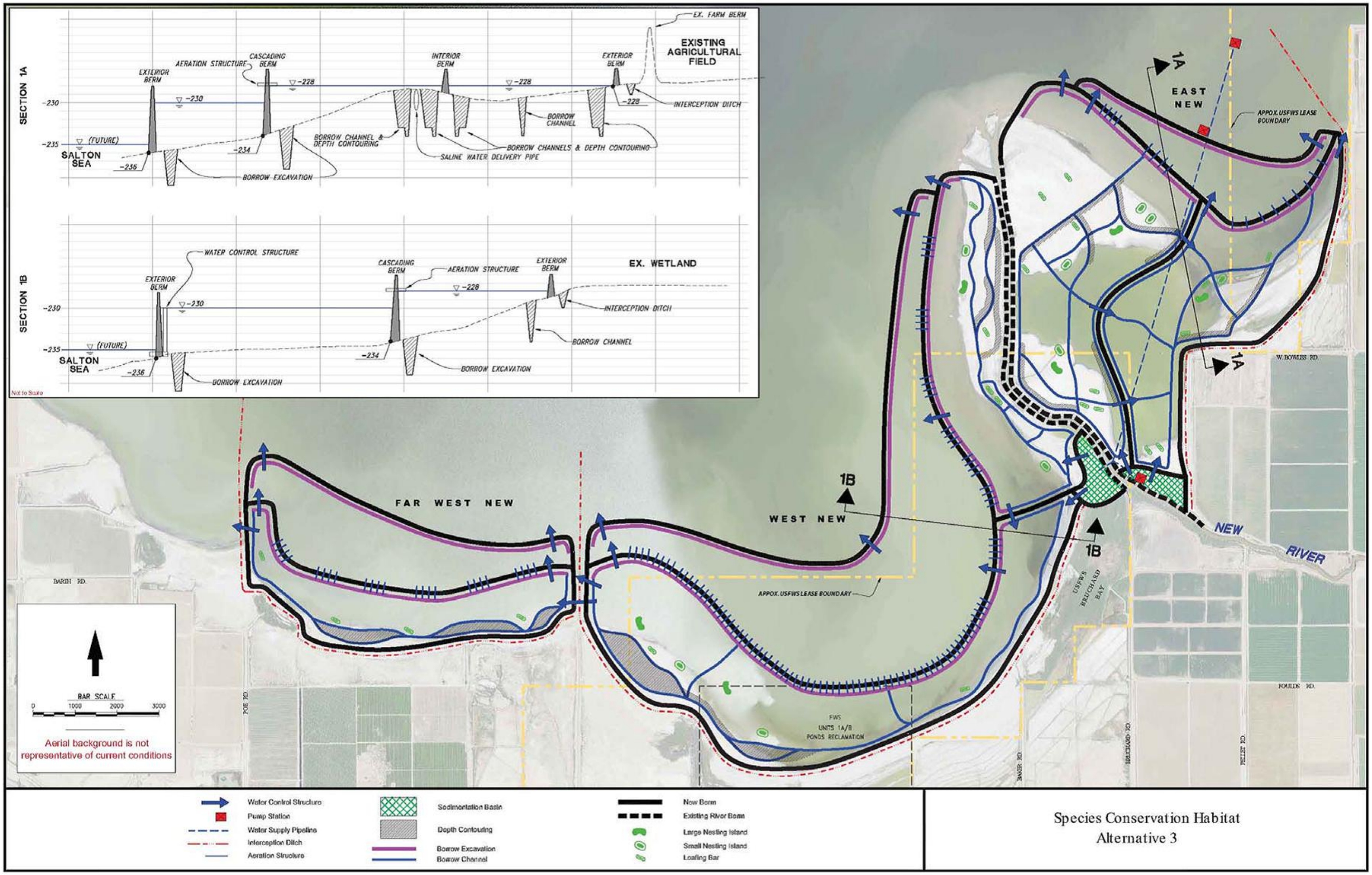

Figure 29. Alternative 3 (New River-Preferred Alternative) from the Species Conservation Habitat EIR/EIS.

- Creating a mixture of water habitat and dry land,
- Evaluating the timing of habitat construction, and
- The disposition of small drains that may hold pupfish.

Geothermal exclusion areas west of the New River are not anticipated.

The water sources are the New River and drain flows for fresh and brackish water, and the Salton Sea for saline water. The potential for common water diversion and distribution facilities for the east and the west will be explored.

The optimum method of moving water through multiple habitat features will be addressed through the modeling and engineering analysis of pumps and gravity flow systems. Different combinations of conveying water will be analyzed, including:

- Discrete conveyance system that feeds water to individual habitats,
- Linear system that connects multiple storage ponds, each of which feeds individual habitats, and
- Linear system that uses habitat ponds as the conveyance system.

Each of these options requires specific engineering considerations concerning maintaining the hydraulic head so that the water will flow by gravity. In some instances, water may have to be lifted to serve another section of habitat. In this case, the cost of a pumped system versus gravity flow will be evaluated.

The physical features of each of the three habitat concepts identified, will be described, including:

- Berm length and shape
- Diversion facilities from the river and the Sea,
- Lift stations or other pumping facilities,
- Sediment control basins,
- Roads and access points,
- Conveyance facilities, and
- Outlet works.

The geotechnical constraints are an important considerations for the placement of berms, the size and shape of the berm, and whether to build in the “wet” or the “dry”. The underlying topography is important for defining the pond shape and water depth. The shape, in turn, defines the cost per unit area of habitat. In some instances, certain habitats may not be cost effective because of their shape or size.

The nearest power source for project operations will be identified. In addition, land ownership over proposed project areas will also be identified.

Consideration will be given to the use of the agricultural drains that enter the playa and the pupfish that use the drains. Pupfish habitat may consist of individual ponds at the end of specific drains or constructed ponds that connect multiple drains. There will also be drains that are conveyed directly to the Sea without direct connection with any of the proposed habitats.

Finally, the salinity as a function of time will be assessed in the various habitats (allowing for seasonal and inter-annual variations) to assure that the water quality matches the desired habitat.

A multiple habitat concept is presented in Figure 30. In this case, a water supply pond feeds water to habitat ponds at the highest elevation on the playa. These habitat ponds could later be converted to water supply ponds. The model will be used to simulate possible combinations for these features.

Figure 30. Multiple Habitat Concepts for the New River.

The general modeling layout of a multiple habitat configuration is shown in Figure 31. In this example, the primary water storage pond located high on the playa (elevation -226 feet, NAVD 1988) contains a combination of river and Sea water that will be supplied to the other habitats on the playa. A water conveyance line (pipeline or canal), supplies water to another water supply pond, also high on the playa (-226.7 feet, NAVD 1988), which is used to independently supply water to other uses. Each water supply pond has specified operational parameters such as capacity, target storage, target salinity, and residence time. Water is released or stored in the water supply pond to accommodate the operational constraints. The types of habitat that can be accommodated depend on the proximity to the water supply pond. For example, dust suppression is a minimal user of water and therefore is typically situated at the end of a delivery system. Shallow water habitat will also be located at the end of the delivery system (although there may be sufficient water in the shallow water habitat to occasionally supply water for dust suppression at the end). Some ponds may have operational releases of water back to the Sea in order to maintain the specified conditions in the pond.

Outcomes and Deliverables

This task will develop three concept alternatives through analysis of the habitat needs under the 10-year plan, available water supply, available land area, and cost effectiveness of the concept. The three concepts will include engineering details and concept-level cost estimates to provide initial evaluation criteria. The level of design will be equivalent to a 35% design.

The deliverables include:

- 35% design concepts that include general layout of berms and other facilities (similar to what appeared in the SCH EIR/EIS),
- Concept design cost estimates,
- Identification of opportunities and constraints for the concepts, and
- Model results that summarize the operation of the three concepts.

Following completion of this concept development phase, a Preferred Concept and two alternatives will be selected for further analysis. The analysis will then move to the design, environmental compliance, and permitting efforts the will be addressed in a new scope.

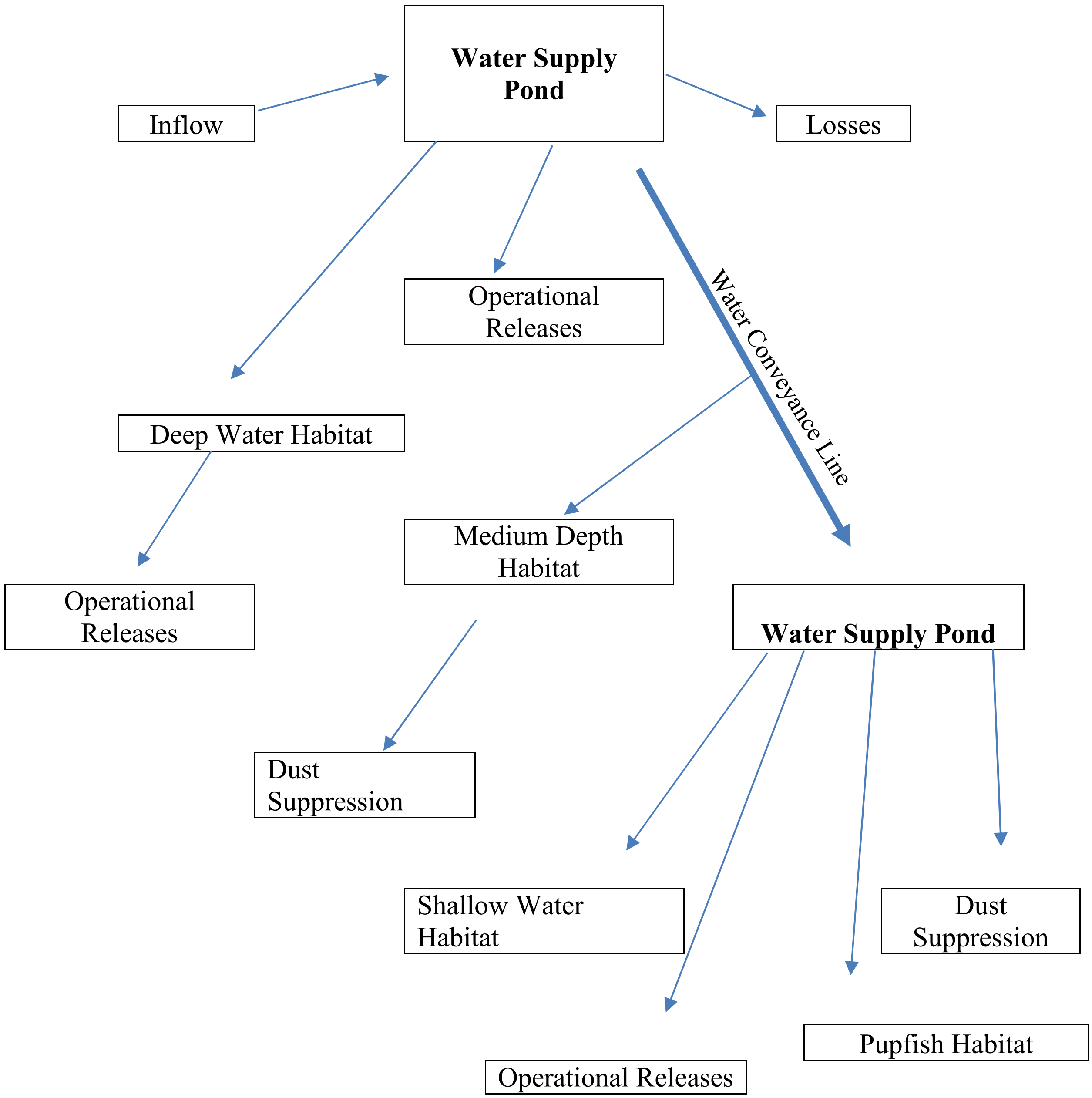

Figure 31. Example of a Water Supply/Habitat Concept to Evaluate with the Model.

Chapter 10. Alamo River North and South

Summary

This chapter describes the assessment of habitat availability, type, water use, and acreage on the north and south sides of the Alamo River, based on the projected recession of the Salton Sea. The model described in Chapter 4, will be used to help develop conceptual plans for development of habitat at the Alamo River. The land uses available on the north side include geothermal production, air quality management, shallow water habitat, deep water habitat, and water supply storage. A key element of the analysis is to determine the optimum method of passing the water through the various habitats. The general approach presented in this chapter follows that for the New River areas, although it is envisioned that specific work required for the development of each of these project areas will be performed separately in the sequence presented Chapter 1.

Goals and relationship to SSMP

This analysis will support the SSMP by identifying a combination of habitats that can be economically constructed and provide the required habitat acreage. Combinations of wet and dry habitat that can reasonably be served from the water supply ponds will be investigated. In addition, conveyance routes to move water between ponds or deliver water to specific ponds that minimize pumping to lift the water will be evaluated. To accomplish this, the ponds must be aligned to allow gravity flow.

The goal of this Task Order is to analyze and select various land use combination that meet the acreage goals of the 10-year plan that can be presented as three design concepts for Alamo North.

Prior Work

Both the Initiative and the 10-year Plan previously developed by IID explored options for habitat and water supply development at Alamo River North for the next 10 years. The previous analysis looked at supplying water to a chain of wet habitats with dry habitats nearby.

The SCH project includes the analysis and environmental compliance, for habitats on the north side of the Alamo River that will be used in this analysis (Alternatives 4-6 in the EIR/EIS, Figure 32). The Red Hill Bay (RHB) project is currently building wet and dry habitat south of the Alamo River for a total of 550 acres.

This Task Order will build on the previous work using the model developed in Chapter 2. This work will develop two additional concept designs in addition to building on the layout developed by IID.

Approach

The model developed in Chapter 2 will be used to create and assess possible habitat types. The analysis will use the 2028 projected Salton Sea elevations and stream flows and also consider the land ownership for placing habitats. Factors to consider with the model include:

- Estimating the required size of water storage facilities,
- Incorporating water conveyance between ponds into the selected habitat,
- Creating a mixture of water habitat and dry land,
- Evaluating the timing of habitat construction, and
- The disposition of small drains that may hold pupfish.

The water sources are the Alamo River and drain flow for fresh and brackish water and the Salton Sea for saline water. Although this scope of work does not provide the planning and design for RHB, the potential for common water diversion and distribution facilities will be explored.

The optimum method of moving water through multiple habitat features will be addressed through the modeling and engineering analysis of pumps and gravity flow systems. Different combinations of conveying water will be analyzed, including:

- Discrete conveyance system that feeds water to individual habitats,
- Linear system that connects multiple storage ponds, each of which feeds individual habitats, and
- Linear system that uses habitat ponds as the conveyance system.

Each of these options requires specific engineering considerations concerning maintaining the hydraulic head so that the water will flow by gravity. In some instances, water may have to be lifted to serve another section of habitat. In this case, the cost of a pumped system versus gravity flow will be evaluated. An example of multiple habitats is provided in Figure 33.

The physical features of each of the three habitat concepts identified, will be described, including:

- Berm length and shape
- Diversion facilities from the river and the Sea,
- Lift stations or other pumping facilities,
- Sediment control basins,
- Roads and access points,
- Conveyance facilities, and
- Outlet works.

The geotechnical constraints are an important consideration for the placement of berms, the size and shape of the berm, and whether to build in the “wet” or the “dry”. The underlying topography is important for defining the pond shape and water depth. The shape, in turn, defines the cost per unit of habitat. In some instances, certain habitats may not be cost effective because of their shape or size.

The nearest power source for project operations will be identified. In addition, land ownership over proposed project areas will also be identified.

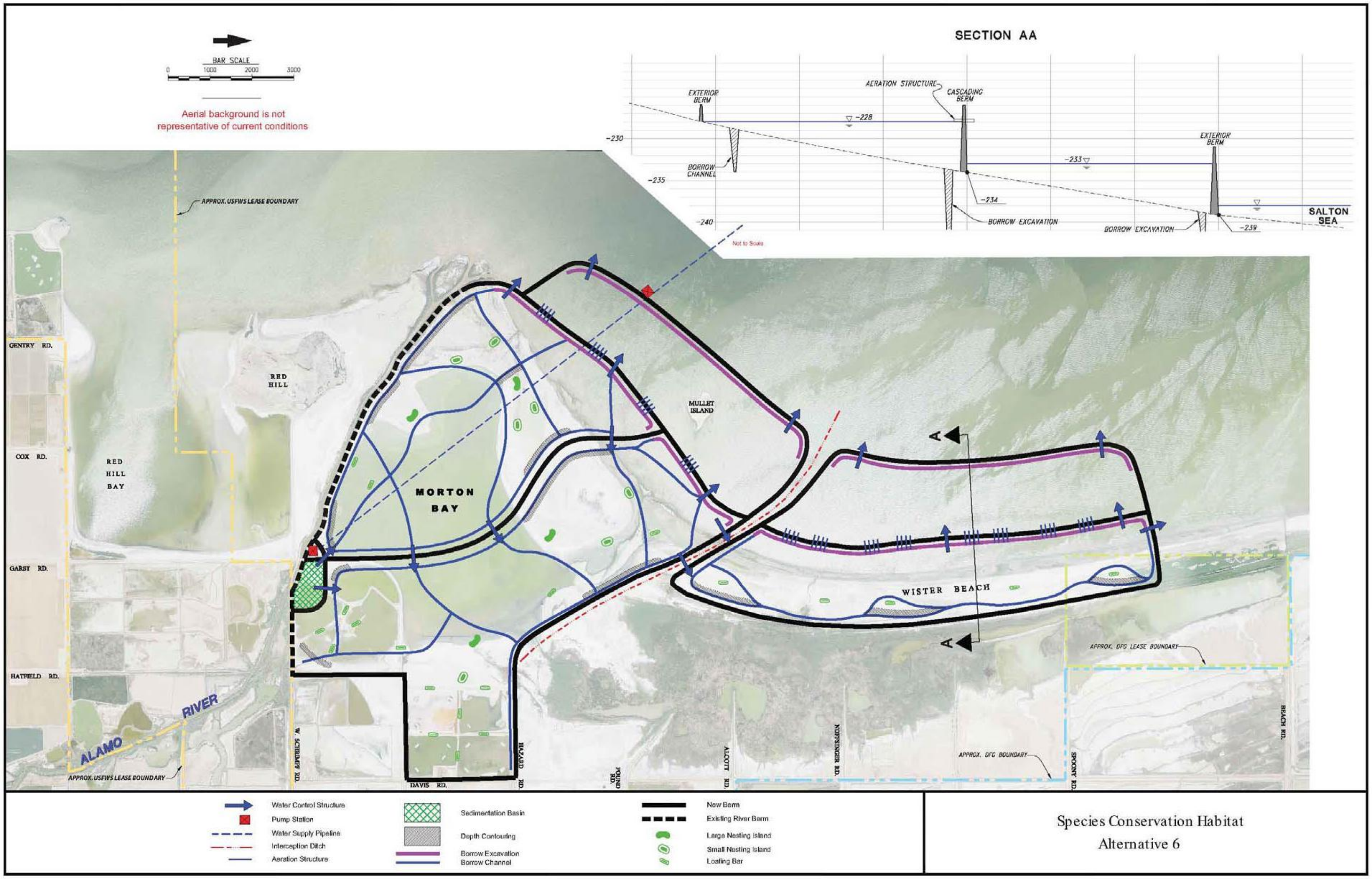

Figure 32. Alternative 6 (Alamo River) from the Species Conservation Habitat EIR/EIS.

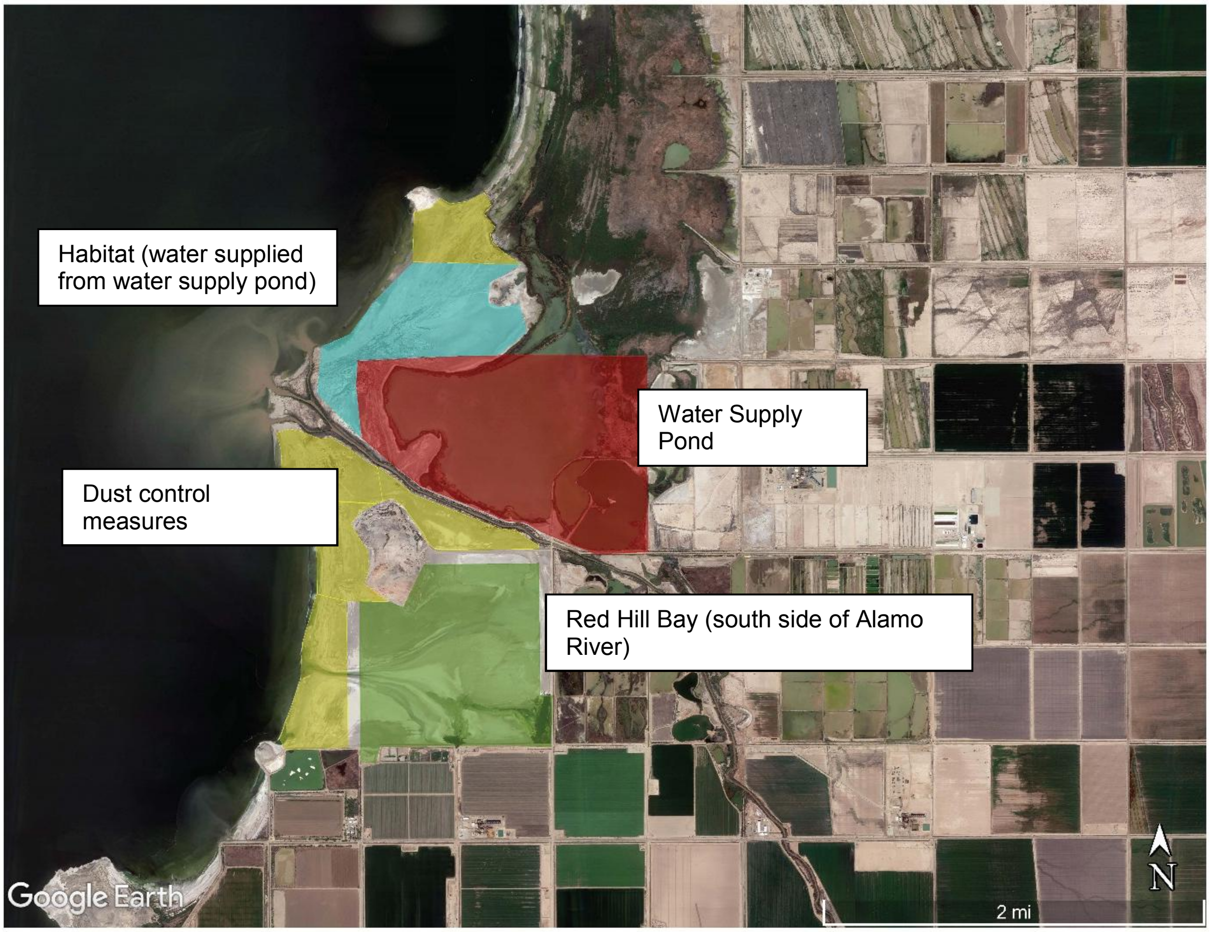

Figure 33. Multiple Habitat Concepts for the Alamo River.

Consideration will be given to the use of the drains that enter the playa and the pupfish use of the drains. Pupfish habitat may consist of individual ponds at the end of specific drains or constructed ponds that connect multiple drains. There will also be drains that are excluded with berms from connecting to any of the proposed habitats and are conveyed directly to the Sea.

Because of the potential for geothermal development on the playa north of the Alamo River, consideration will be given to parcels available for well heads, access roads, and power plants (such as proposed near Mullet Island). The concepts will be structured so as to avoid conflicts with geothermal uses but also, not preclude the uses. Roadways proposed for access to geothermal facilities may also serve as access to habitat features (berms, pipelines, pumping plants).

Finally, the salinity in the various habitats will be assessed to assure that the water quality matches the desired habitat.

Outcomes and Deliverables

This work will develop three concept alternatives through analysis of the habitat needs under the 10-year plan, available water supply, available land area, and cost effectiveness of the concept. The three concepts will include engineering details and concept-level cost estimates to provide initial evaluation criteria. The level of design will be equivalent to a 35% design.

The deliverables include:

- 35% design concepts that include general layout of berms and other facilities (similar to what appeared in the SCH EIR/EIS,
- Concept design cost estimates,
- Identification of opportunities and constraints for the concepts, and
- Model results that summarize the operation of the three concepts.

Following completion of this concept development phase, a selection of a Preferred Concept and two alternatives will be made. The analysis will then move to the design, environmental compliance, and permitting efforts.

Chapter 11. Whitewater River Area

Summary

This chapter describes the assessment of habitat availability, type, water use, and acreage in the vicinity of the Whitewater River in the northern part of the Salton Sea. Following the general approach for the New and Alamo River locations, and using the habitat planning and design tool described in Chapter 4, conceptual plans will be prepared for development of a water supply infrastructure, deep and shallow water habitat, and air quality management near the Whitewater River. Because of the absence of known geothermal resource areas in this region, no areas are proposed to be set aside for geothermal energy production.

Goals and relationship to SSMP

This analysis will support a major component of the SSMP by identifying a combination of habitats and air quality management measures that can be developed on exposed playa in the northern part of the Sea, primarily utilizing freshwater sources from the Whitewater River and from the Salton Sea. To date, a set of wetlands supplied by groundwater have been developed in the northern region, and no preliminary plans akin to the SCH have been developed for the Whitewater River region. Based on preliminary insights developed from work in the southern part of the Sea, combinations of wet and dry habitat that can reasonably be served from a set of water supply ponds will be identified. In addition conveyance routes will be identified to move water between ponds or deliver water to specific ponds that minimize pumping needs and maximize gravity flow. The goal of this work is to analyze and select various land use combinations that meet the acreage goals of the SSMP 10-year plan that can be presented as three design concepts for the Whitewater River area.

Prior Work

Existing wetlands for habitat in the Whitewater River area have been constructed by the Torres Martinez Tribe in 2006 and were recently refurbished in 2016 (Figure 34). These wetlands are supplied by groundwater and are different in character from future planned habitat that is expected to be constructed using Whitewater River water and Salton Sea water. Specifically, these wetlands are supplied by freshwater and no prior concern with selenium exists in the groundwater source employed. Although water quality in these wetlands has been monitored, the results are not directly comparable to the brackish water habitats that are envisioned for the future. However, these wetlands do provide a basis to evaluate habitat types preferred by different avian species.

Water quality characterization in the Whitewater River (as summarized in Chapter 3) is pertinent to the design of habitat in this region. In particular, selenium concentrations in the Whitewater River are about half the levels in the New and Alamo Rivers, and given a freshwater selenium target, may allow a greater fraction of freshwater to be used in the design of habitat.

No previous field work has been performed on large scale habitat development and air quality management in the Whitewater River area.

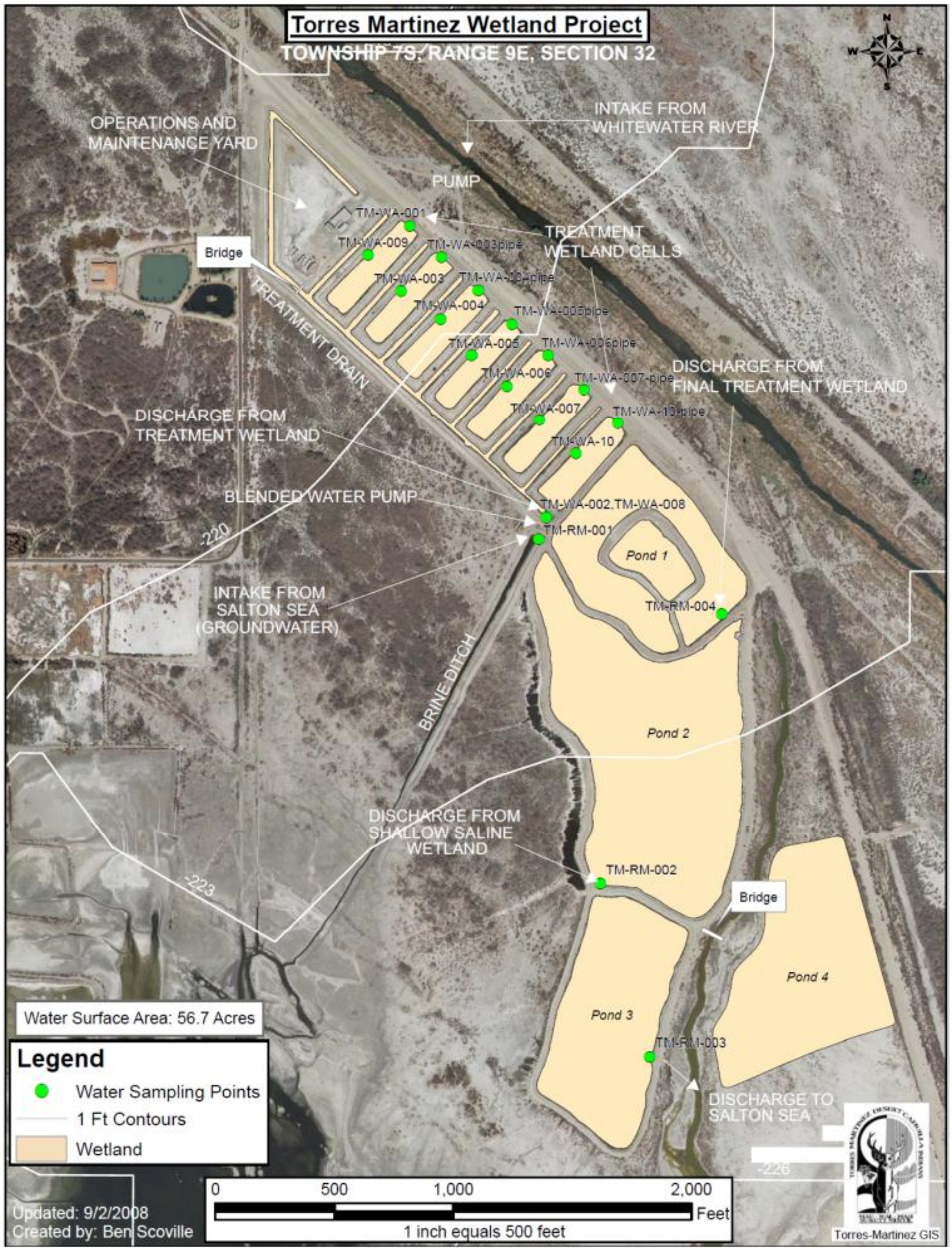

Figure 34. Design of existing Torres Martrinez Wetland project. Not all elements of this project were constructed. Although an intake is shown from the Whitewater River, this project currently operates using pumped groundwater.

Approach

The habitat planning and design tool described in Chapter 4 will be used to create and assess possible habitat types. The analysis will use the 2028 projected Salton Sea elevations and stream flows and also consider the land ownership for placing habitats. Factors to consider with the model include:

- Estimating the required size of water storage facilities,
- Incorporating water conveyance between ponds into the selected habitat,
- Creating a mixture of water habitat and dry land,
- Creating and maintaining air quality management areas on dry land,
- Evaluating the timing of habitat construction.

The water sources are the Whitewater River for freshwater and the Salton Sea for saline water. A conceptual representation of the different areas are shown in Figure 35.

The optimum method of moving water through multiple habitat features will be addressed through the modeling and engineering analysis of pumps and gravity flow systems. Different combinations of conveying water will be evaluated, including:

- Discrete conveyance system that feeds water to individual habitats,
- Linear system that connects multiple storage ponds, each of which feeds individual habitats, and
- Linear system that uses habitat ponds as the conveyance system.

Each of these options requires specific engineering considerations for maintaining the hydraulic head so that the water will flow. In some instances, water may have to be lifted to serve another section of habitat. In this case, the cost of a pumped system versus gravity flow will be evaluated.

The physical features of each of the three habitat concepts identified, will be described, including:

- Berm length and shape
- Diversion facilities from the river and the Sea,
- Lift stations or other pumping facilities,
- Sediment control basins,
- Roads and access points,
- Conveyance facilities, and
- Outlet works.

The geotechnical constraints are an important consideration for the placement of berms, the size and shape of the berm, and whether to build in the “wet” or the “dry”. The underlying topography is important for defining the pond shape and water depth. The shape, in turn, defines the cost per unit of habitat. In some instances, certain habitats may not be cost effective because of their shape or size.

The nearest power source for project operations will be identified. Land ownership over proposed project areas will also be identified.

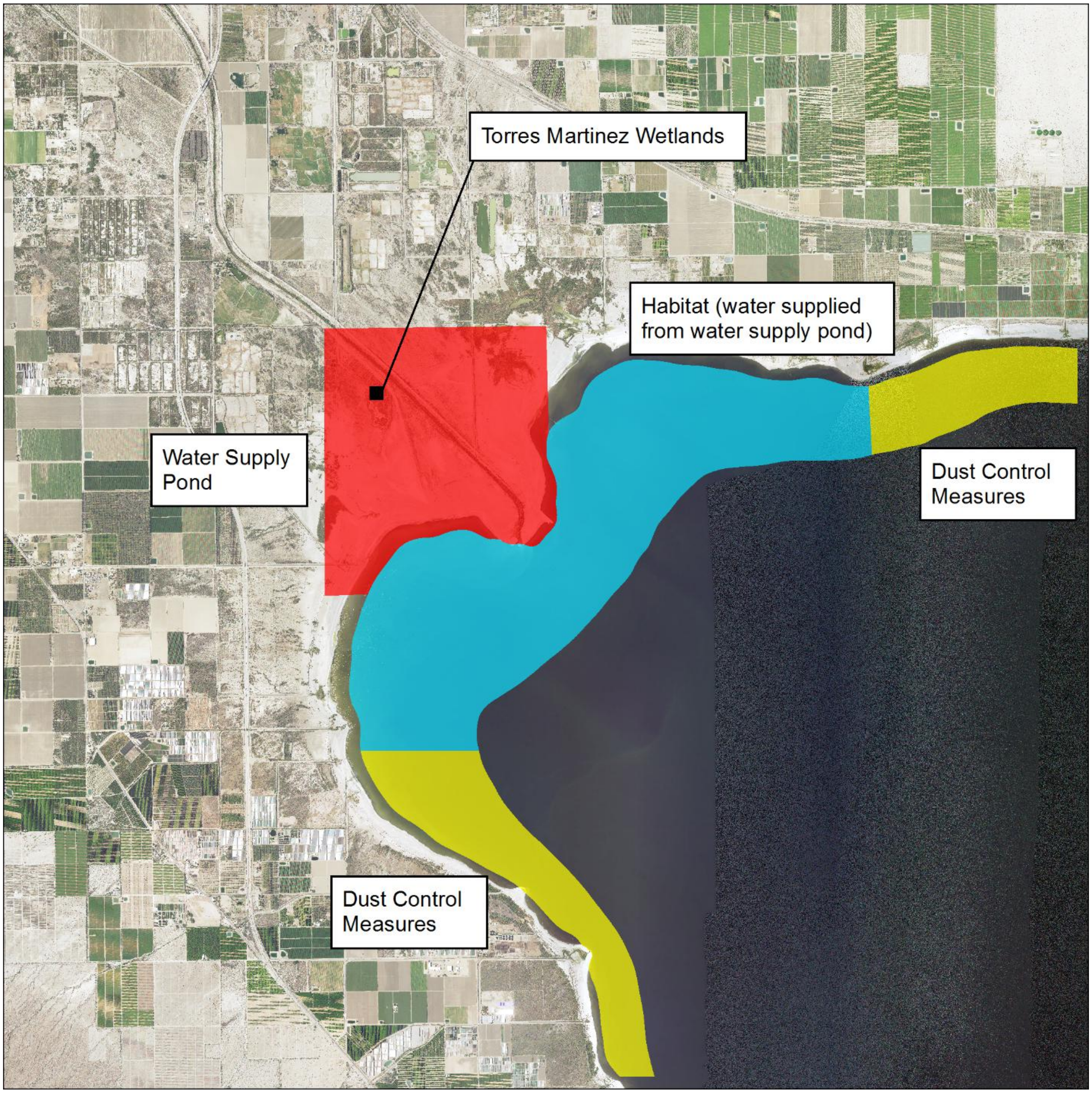

Figure 35. Multiple Habitat Concepts for the Whitewater River. The seaward edge of the diagram represents projections of exposed playa by 2028. The location of the existing Torres Martinez wetlands (detail shown in Figure 34) is also indicated.

Although direct connectivity of drains and the Salton Sea in the Whitewater River area is less extensive than in the south, consideration will be given to the use of the drains that enter the playa and the pupfish use of the drains. Pupfish habitat may consist of individual ponds at the end of specific drains or constructed ponds that connect multiple drains. There will also be drains that are excluded with berms from connecting to any of the proposed habitats and are conveyed directly to the Sea.

Outcomes and Deliverables

This work will develop three concept alternatives through analysis of the habitat needs under the 10-year plan, available water supply, available land area, and cost effectiveness of the concept. The three concepts will include engineering details and concept-level cost estimates to provide initial evaluation criteria. The level of design will be equivalent to a 35% design.

The deliverables include:

- 35% design concepts that include general layout of berms and other facilities (similar to what appeared in the SCH EIR/EIS,
- Concept design cost estimates,
- Identification of opportunities and constraints for the concepts, and
- Model results that summarize the operation of the three concepts.

Following completion of this concept development phase, a selection of a Preferred Concept and two alternatives will be made. The analysis will then move to the design, environmental compliance, and permitting efforts.

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SECTION IV: CONCLUSIONS

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Chapter 12. Summary and Proposed Schedule

This document provides an outline of the various activities that are envisioned to take place over the next 2-3 years as various elements of the SSMP move from concept to implementation, and provides a high-level summary of relevant work that has been completed as part of previously funded projects. Section II of this document presents a set of discrete tasks that apply to the entirety of the SSMP, and Section III provides a general approach to be undertaken to develop specific projects in five areas at the northern and southern ends of the Salton Sea. Depending on staffing and funding availability, some of these tasks may be performed in parallel, and others, especially relating to the specific project areas, may be performed sequentially. As noted in the Introduction, the work outlines presented in this draft are subject to review by the SSMP advisory committees, and will be updated following their review. Over the implementation period of this Work Plan, the approach described for the project areas may be updated as new data, insights, and performance efficiencies develop through the implementation of the higher priority areas.

Based on current information, the schedule of tasks is as follows:

Task	**Time Frame**
Hydrology for Project Implementation	Ongoing-Mar 2018
Water Quality for New Habitat Creation	Ongoing-Mar 2018
Habitat planning and design tool	Dec 2017-Jun 2018
Air Quality Management Plan	Dec 2017-Mar 2018
Environmental Compliance Requirements	Ongoing
Compatibility with Other Regional Planning Docs	Dec 2017-Jun 2018
New River West Restoration Design	Jul 2017-Dec 2018
Alamo River North Restoration Design	Jan 2018-Dec 2018
Whitewater River Area Restoration Design	Jan 2018-Dec 2018

Cost estimates for each task will be developed at a future date based on the planned staffing, and whether the work is performed by State of California staff or by the SSMP contractor team.

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